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THE ENGINEER

AUGUST 7, 1959 28 ESSEX ST., STRAND, LONDON, W.C.2 VOL. 208 No. 5402

PUBLIC APPOINTMENTS

WALSALL AND STAFFORDSHIRE TECHNICAL COLLEGE

JOINT EDUCATION COMMITTEE

Principal: H. Cheetham, B.Sc. Hons., A.M.I.Mech.E., M.I.Prod.E.

HEAD OF ENGINEERING DEPARTMENT, GRADE III

Applications are invited for the following full-time appointment, the duties to commence as soon as possible.:

Head of Engineering Department, Grade III

Applicants should possess a degree in electrical or mechanical engineering and should have had experience of teaching in a college of further education.

The salary will be in accordance with the Burnham Further Education Report, 1956, viz: £1,600 by £50 to £1,750 per annum plus the 5 per cent. addition recently approved.

Application forms and further particulars may be obtained from the Principal, Walsall and Staffordshire Technical College, Wisemore, Walsall, Staffordshire, to whom completed application forms should be returned not later than Friday, 4th September, 1959.

V. MILLSON
Secretary to the Joint Committee

E6971

UNIVERSITY OF SYDNEY

LECTURESHIP/SENIOR LECTURESHIP IN ELECTRICAL ENGINEERING

Applications are invited for the above position. Applicants should have good academic qualifications in Electrical Engineering, experience in the power field, and a working knowledge of electronic techniques. The successful applicant will take part in teaching, primarily in the field of electrical machines, and in research.

The salary for a Senior Lecturer is within the range £A2,200—80—£2,600 per annum; for a Lecturer within the range £A,500—90—£2,100 per annum. In each case cost of living adjustment will be allowed. The salary is subject to deductions under the State Superannuation Act. The commencing salary will be fixed according to the qualifications and experience of the successful applicant.

Under the Staff Members' Housing Scheme in cases approved by the University and its Bankers, married men may be assisted by loans to purchase a house.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close in Australia and London on 30th September, 1959.

E6983

BRADFORD INSTITUTE OF TECHNOLOGY

Principal: E. G. Edwards, Ph.D., B.Sc., F.R.I.C.

SENIOR LECTURER IN MECHANICAL ENGINEERING

Applications are invited for the post of Senior Lecturer in Mechanical Engineering.

Successful candidates will be given adequate facilities to undertake and direct research and suitable technical assistance and equipment are available. Senior members of staff are encouraged to undertake consultant work in industry and may retain fees paid for such work.

The salary scale for men, in accordance with the Burnham Technical Award, is from £1417 10s. 0d. to £1627 10s. 0d. per annum. This scale is at present under revision.

Previous industrial or research experience at a suitable level will be taken into account in fixing the commencing salary.

Further particulars and forms of application may be obtained from the Registrar, Institute of Technology, Bradford 7.

W. H. LEATHEM,
Clerk to the Governors.

E6981

ROYAL MILITARY COLLEGE OF SCIENCE

SHRIVENHAM, BERKSHIRE

SENIOR LECTURERS OR LECTURERS

Royal Military College of Science, Shrivenham, Berkshire, requires two male Senior Lecturers or Lecturers in the Department of Electrical and Instrument Technology. Teaching is at University level. Good facilities and freedom of choice for research. Qualifications: First or Second Class Honours degree in Electrical or Mechanical Engineering, Physics or Mathematics and interest in automatic control and servo-mechanisms, analogue and digital computing, and general instrumentation. Salary: Senior Lecturer £1,166—£1,420: Lecturer £615—£1,120. Starting pay may be above minimum in both cases: credit for post-graduate experience and National Service. Superannuable with good prospects of permanency. Quarters in residential officers' mess for single men. Possibility of houses after a waiting period for married men. Particulars and forms from M.L.N.S., Technical and Scientific Registrar (K) 26 King Street, London, S.W.1. quoting D 334/9A.

E6970

PUBLIC APPOINTMENTS

UNIVERSITY OF HONG KONG

READERSHIP IN ELECTRICAL ENGINEERING

Applications are invited for the newly-established post of Reader in Electrical Engineering.

Annual salary (superannuable) is £2,500 (man) or £1,900 (woman) together with an expatriation allowance of £300 a year if applicable. The equivalent of income tax in the Colony is comparatively low.

Applicants must be graduates of a British Commonwealth University or equivalent and must be Corporate Members of the Institution of Electrical Engineers with teaching and research experience at university level.

First-class sea passages are provided for expatriate staff and their families on first appointment and leaves.

Further information and particulars as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close in Hong Kong and London on 15th September, 1959.

E6984

UNIVERSITY OF BRISTOL

DEPARTMENT OF CIVIL ENGINEERING

Applications are invited for a Lectureship (Grade III or II) in the Department of Civil Engineering. Applicants should have good honours degree and some practical experience, preferably in the field of structural steelwork. It is desirable that candidates should be under 35 years of age and have some teaching experience.

Salaries will be in accordance with the following scales:—

Assistant Lecturer (Grade III)
£700—£850.

Lecturer (Grade II)
£900—£1,300 (bar)—£1,650.

The appointment is to be made as soon as possible and the successful candidate will be required to take up duty not later than the 1st January, 1960. Applications, including the names of two persons to whom reference may be made, should be sent to the Registrar, The University, Bristol 8, from whom further particulars may be obtained.

E6957

WILTSHIRE EDUCATION COMMITTEE

NORTH-WEST WILTS AREA COLLEGE OF FURTHER EDUCATION CHIPPENHAM

ASSISTANT GRADE B

Applications are invited for the post of Assistant Grade B, to teach Mathematics and Physics. Salary scale £650 × £25 to £1,025, plus 5% with allowances for Graduation, Training and approved experience.

Further particulars and application forms may be obtained from the Principal, Cocklebury Road, Chippenham.

E6958

EAST AFRICAN RAILWAYS AND HARBOURS ADMINISTRATION

QUALIFIED GRADUATES AS CADET CIVIL AND MECHANICAL ENGINEERS

Vacancies exist for qualified graduates as Cadet Civil and Mechanical Engineers under agreement for training up to 3 years, with eligibility on completion for appointment on approbation to the permanent and pensionable establishment as Assistant Engineers.

Total emoluments £880—£1,090 a year. Free passages. Generous leave. Rent free quarters provided.

Candidates for the Cadet Mechanical Engineering vacancy must be aged 21—27 and possess a University degree in Mechanical Engineering, preferably with 12 months practical experience in an engineering (preferably locomotive) works, or, have served an apprenticeship of at least three years in a recognised engineering (preferably locomotive) works and be a Graduate member of the Institute of Mechanical Engineers, or be exempted from Sections A and B of the Associate membership examination.

For the Cadet Civil Engineering vacancy candidates must be under 26 and possess a University degree in Civil Engineering. No practical experience is necessary.

Write Director of Recruitment, Colonial Office, S.W.1., giving full names, age, qualifications and experience, quoting BCD 445/019/04.

E6978

ST. WOOLOS HOSPITAL

NEWPORT

ASSISTANT ENGINEER

Assistant Engineer required. Salary £545 × 20(1) × 25(3) × 30(1) to £670 per annum. Candidates should possess, or be studying for the Ordinary National Certificate. Excellent experience. Superannuation scheme. Write stating age and two referees to T. A. Jones, Group Secretary, 64 Cardiff Road, Newport.

E6976

PUBLIC APPOINTMENTS

COUNTY BOROUGH OF SWANSEA

WATER DEPARTMENT

PRIMARY DISTRIBUTION SYSTEM—EASTERN AREA

CONTRACT 6

The Corporation invite tenders from experienced Contractors for the laying of approximately 3,400 yards of spun iron and asbestos water mains from 18in. to 9in. diameter between Bonymaen and Gelli Grafog, Swansea.

Copies of Specification, Bill of Quantities, Form of Tender and Drawings may be obtained from the Borough Water Engineer and Manager, The Guildhall, Swansea, on deposit of two guineas which will be refunded on the submission of a bona fide tender (not subsequently withdrawn) and the return of the above-mentioned documents.

Tenders in plain sealed envelopes with no indication of the sender, endorsed "Water Department—Contract 6" may be sent by registered post or delivered by hand in exchange for a receipt to the undermentioned on or before Monday, 10th August, 1959.

The Council does not bind itself to accept the lowest or any tender.

T. B. BOWEN,
Town Clerk.

The Guildhall,
SWANSEA.

WAR DEPARTMENT WORKS ORGANISATION

SENIOR AND MAIN GRADE MECHANICAL AND ELECTRICAL ENGINEERS

War Department Works Organisation require Senior and Main Grade Mechanical and Electrical Engineers. Salary—Senior Grade: £1,790—£2,070 (National)—Main Grade: £1,285—£1,730 (National). London allowance is payable (including Chessington). Reduction in small provincial towns. Candidates should have had extensive experience either in large engineering maintenance organisation or in design and execution of heating, ventilating and air conditioning and/or electrical installations, with engineering degree or corporate membership of Institutions of Mechanical, Electrical or Civil Engineers. Forms from M.L. & N.S., Technical and Scientific Register (K), 26 King Street, London, S.W.1., quoting C376/9A.

E6979

TENDERS

CITY OF LEEDS

WATERWORKS DEPARTMENT

Tenders are invited for the Construction, completion and maintenance of a rapid gravity filteration works and pumping station of 15 million gallons per day capacity, together with a 5 million gallons clear water reservoir and other ancillary works at Eccup Reservoir in the City of Leeds.

Contract documents and General Arrangement and Typical Detail Drawings may be collected from the undersigned upon payment of a deposit of Ten Guineas which will be refunded following the receipt of a bona fide Tender and the return of all Contract documents.

Arrangements may be made for detail drawings to be inspected on application to the Waterworks Department, Room 14, Civic Hall, Leeds, 1.

Tenders, duly completed, must be enclosed in plain sealed covers addressed to the Town Clerk and endorsed "Tender for Eccup Filteration Works", and be delivered at the Town Clerk's Office, Room 57, Civic Hall, Leeds 1, not later than 12 noon on MONDAY, the 14th SEPTEMBER, 1959. The corporation does not bind itself to accept the lowest or any Tender.

KENNETH L. FORSTER, M.I.C.E.
General Manager & Engineer

Waterworks Department,
Civic Hall,
Leeds. 1.

E5902

GOVERNMENT OF MALTA

WATER SUPPLY

Tenders are invited by the Maltese Government for the supply and erection of water pumping plant for two pumping stations on the island of Malta. The plant required consists of a total number of eight electro-submersible pumping sets each rated at about 25,000 g.p.h. complete with motors, starters, switchgear, instruments, pipework, cabling, etc.

Tender documents and drawings may be obtained at the office of The Treasurer, The Palace, Valletta, Malta, or at the office of the Engineers, Messrs. Binnie, Deacon & Gourley, Artillery House, Artillery Row, Westminster, London, S.W.1., on payment of Two Pounds for each copy of the documents, on or after Thursday, 13th August, 1959.

Sealed tenders in duplicate in a plain envelope endorsed "Tender for Water Pumping Plant, etc. for Ta' Bakkja and Ta' l-Isperanza" shall be delivered at the office of The Treasurer, The Palace, Valletta, Malta, not later than 10 a.m. on Thursday, 1st October 1959.

The Maltese Government do not undertake to accept the lowest or any tender, and will not defray any expenses incurred by tenderer who will, nevertheless, be presumed to have acquainted themselves fully with the site and conditions of the work.

THE TREASURER,
Malta.

E.6974

EDUCATIONAL

A.M.I.MECH.E., B.Sc., City and Guilds, &c. Guarantee Postal Courses for all Exams. and Technical Divisions from Elementary to Degree standard including Automation Techniques. Approximately 95 per cent successes. 148-page prospectus free on request.—B.I.E.T. (Dept. 22), 29, Wright's Lane, London, W.8. E114 z

ELECTRONICS, covering practical and theoretical aspects, basic principles, industrial applications, electronic apparatus, &c. Guaranteed coaching for Brit.I.R.E., City and Guilds, &c. Study at home under highly qualified tutors.—Write for free book: International Correspondence Schools, 71, Kingsway (Dept. 446A), London, W.C.2. E157 z

SITUATIONS VACANT

APPLICANTS ARE ADVISED TO SEND COPIES NOT ORIGINALS, OF THEIR TESTIMONIALS UNLESS OTHERWISE REQUESTED.

A DESIGN/DRAUGHTSMAN required by expanding Engineering Company for new Factory being erected in East Anglia. A good knowledge of plant layout, mechanical handling, automatic feed mechanisms coupled with general factory services is required. Previous experience is essential. H.N.C. level preferred. Production engineering or Works Study experience an advantage. Initially posted in Essex, later East Anglia. Attractive working conditions. Part-contributory pension and life assurance scheme. Salary commensurate with age, experience and qualifications. Write giving full details of career to Box No. E6940, "The Engineer".

A DESIGN ENGINEER

is required by

Texaco Trinidad, Inc.,

for oil refinery pipe and vessel work, and also to a lesser extent for straightforward structural and concrete design work, in Trinidad, West Indies.

Applicants should have a university degree in Mechanical or Civil Engineering, or be at least Graduate Members of one of the corresponding professional institutions. They should also have three years experience of refining or similar high pressure and temperature pipe and vessel design.

The starting salary for this pensionable position will be between £1175 and £1450 p.a., depending on experience and qualifications, and subsidised housing and schooling for children will be available.

Please write with brief particulars to the
Personnel Officer,
Trinoil (U.K.) Limited,
Trinidad House,
Old Burlington Street,
London, W.1.

E6955

A WELL-KNOWN COMPANY in the Birmingham area requires a first class graduate mechanical engineer having experience in internal combustion engine research and development. The person appointed will be responsible for leading a team of engineers engaged in fundamental engine performance investigations, including thermodynamic studies in connection with internal combustion engines and petrol engines. The post is permanent and pensionable and offers scope for promotion. Apply giving full details of age, qualifications and experience to Box No. E6987, "the Engineer".

ASSISTANT ENGINEER required from the 1st October at Grove Park Hospital, Lee, S.E.12. Applicants should have completed an apprenticeship in mechanical engineering, or have otherwise acquired sound practical training. Salary according to experience within scale £545 × £20 (1) × £25 (3) × £30 (1) to £670 p.a., plus London weighting (£30 at 26 and over). Long hours gratuities are also payable. Applications stating age, qualifications and experience, with names of two referees, to the Group Secretary at Lewisham Hospital, London, S.E.13.

E6972

BRITISH OXYGEN GASES LIMITED

SENIOR ENGINEER

MEDICAL DEVELOPMENT GROUP

A vacancy has occurred for a Senior Engineer for the Medical Development Group of the Company. The successful applicant should have ability to analyse and investigate problems arising in the development of equipment used in anaesthesia, assisted respiration and oxygen therapy and applicants must be capable of initiating development of apparatus of this kind.

A well qualified man is required with knowledge of the problems of pressure and flow control and/or instrumentation, together with experience in the design or development of pneumatic or light mechanical equipment.

This position offers good prospects for the future. Housing assistance is available if required.

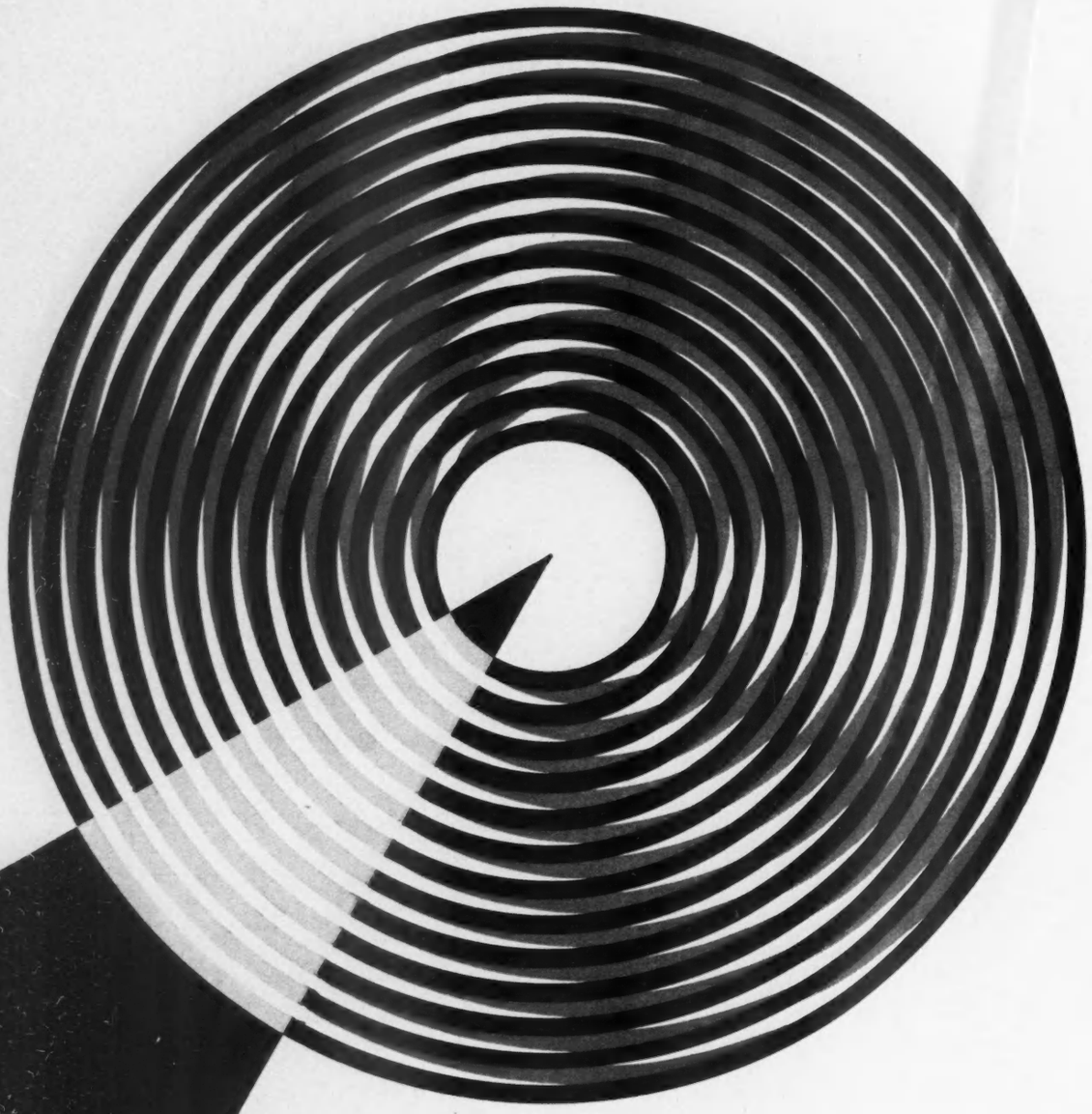
Write stating details of age and experience to:
Personnel Manager,
British Oxygen Gases Ltd.,
Spencer House,
St. James's Place, London, S.W.1.

E6975

CIVIL ENGINEERS between the ages of 27 and 32 required by Consulting Engineers for site work on Hydro Electric Projects in Scotland. Pension Scheme. Salaries in accordance with qualifications. Apply A. H. Clark, Esq., Sir William Halcrow & Partners, Stanhope House, 47 Park Lane, London, W.1.

E6967

Classified Advts. continued on page 19



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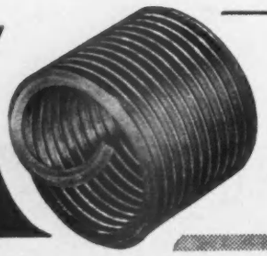

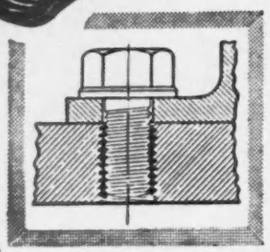

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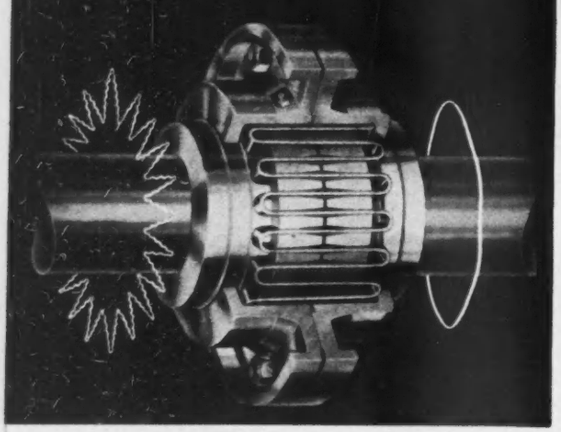

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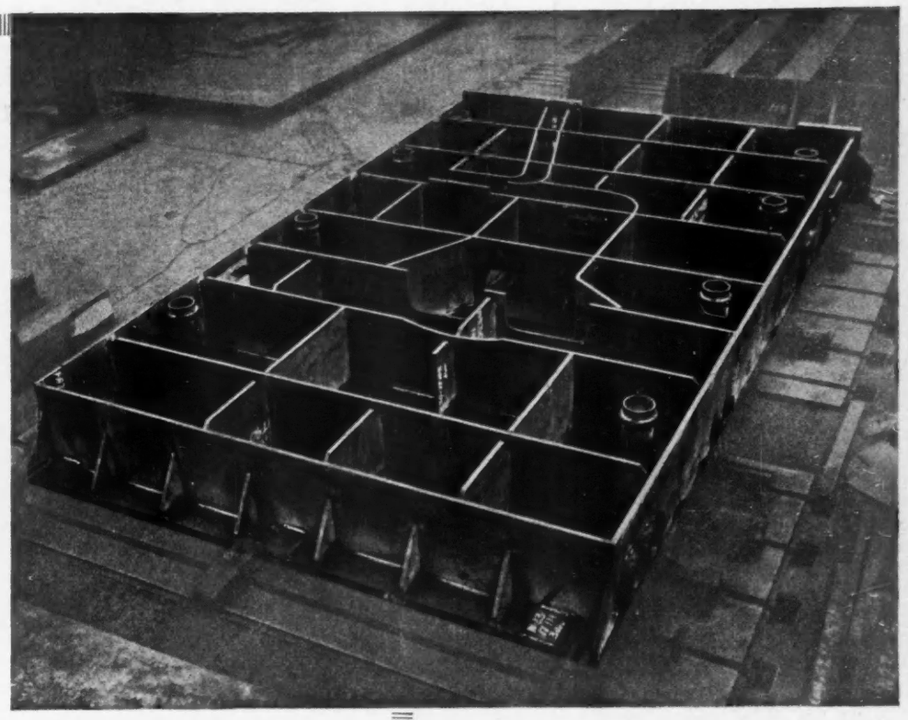

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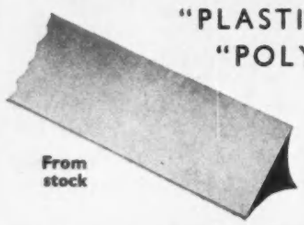

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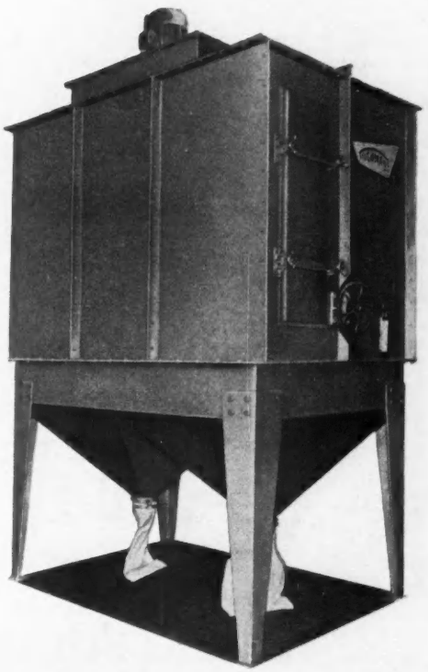
These collectors are built with 50 sq. ft. area and 150 sq. ft. area. The volumes handled are from 250 c.f.m. to 2,100 c.f.m. For further details of these collectors, send for our new leaflet, T.53.

3 NEW DUST COLLECTORS



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These machines are built in a range of filtering areas from 80 sq. ft. to 720 sq. ft., and standard volumes from 1,000 c.f.m. to 6,000 c.f.m.

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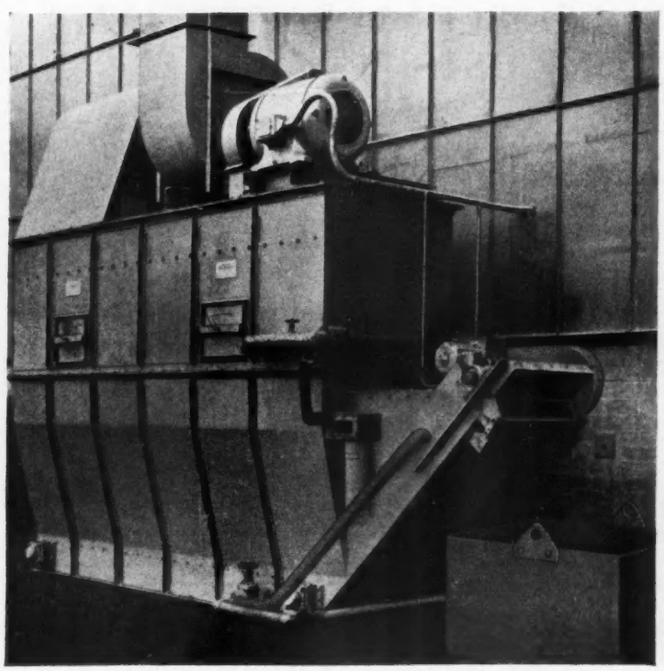

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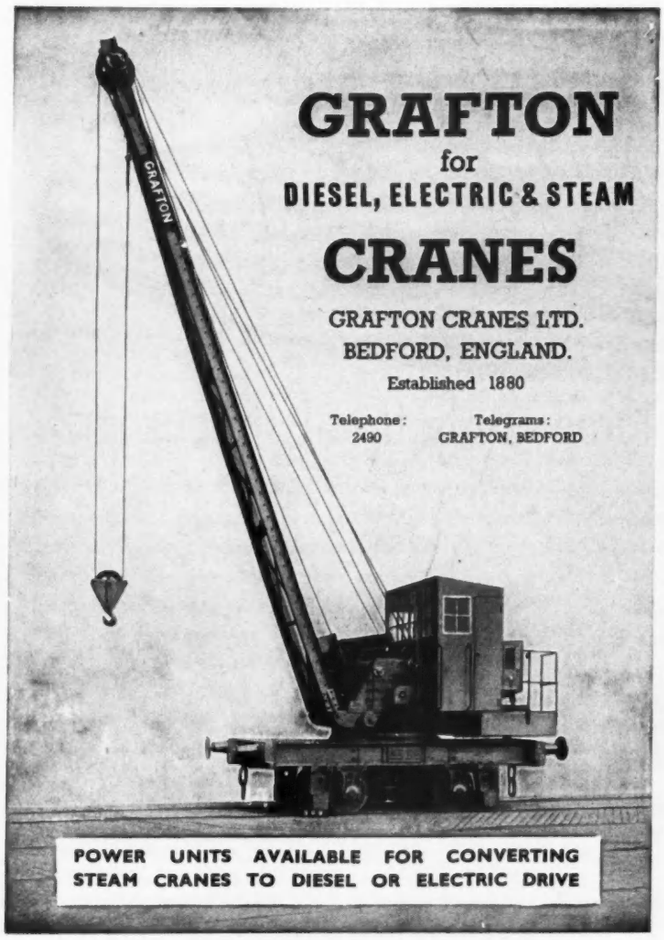

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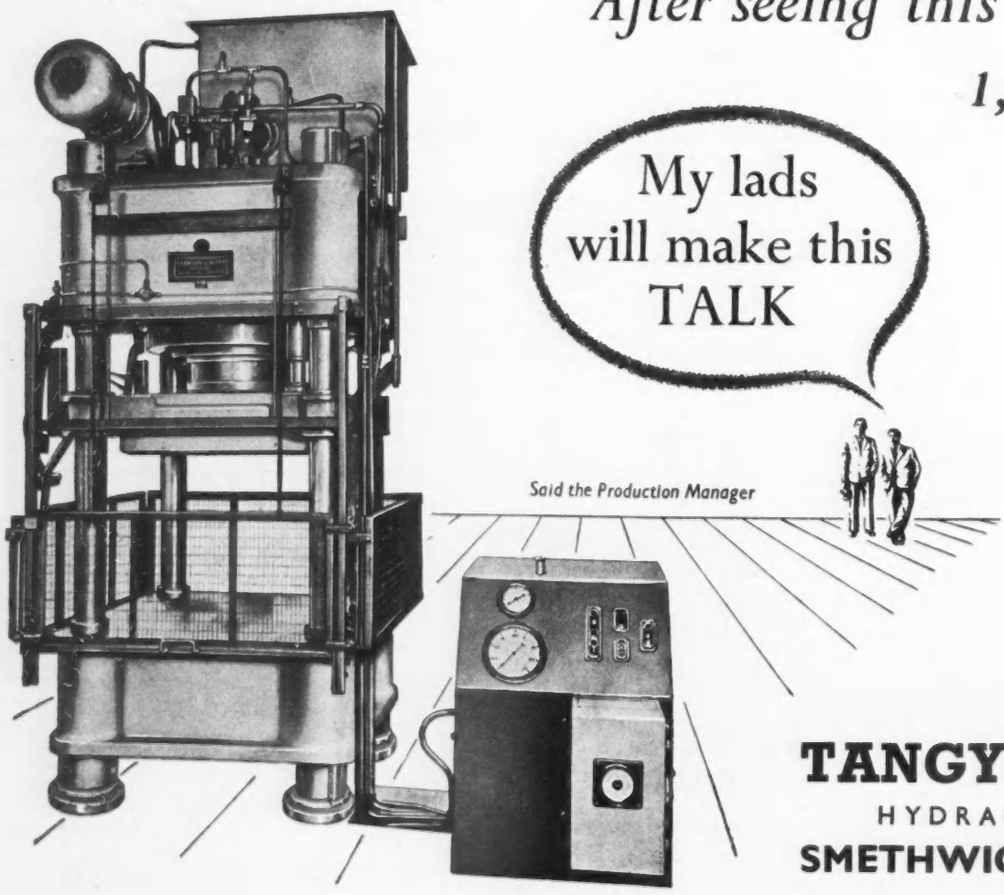

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THE ENGINEER

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EDITORIAL CONTENTS

Hovercraft Prospects... 41
Can We Afford It ? 41
Industrial Safety 41
British Satellites and Rockets 42
British Space Travel 42
100 Years Ago 42
Atomic Energy Establishment, Winfrith 43
Southern Region Kent Coast Electrification. No. II 46
Warren Spring Laboratory 48
Tensile Testing Machine for Radioactive Specimens 50
Diesel Electric Locomotive Progress ... 51
Appointments 52
Business Announcements 52
Contracts 52
Miscellanea 52

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HOVERCRAFT PROSPECTS

In a strictly engineering sense one of the more inspiring of recent events was the journey of the Saunders-Roe "Hovercraft" from Calais to Dover on July 25. It took just over two hours to complete the journey so that its speed cannot be regarded as very high and the trip had been postponed by a day because of rough seas so that the device cannot be regarded as fully seaworthy. But the existing craft is a very early prototype and it can be safely assumed that more advanced craft are already at least in the design stage. Furthermore it is worth noting that the sea was far from smooth as a mill pond when the trip was made. It will be interesting to learn eventually something about costs. To what extent does the device hold out the promise of being able to carry goods and passengers across seas and oceans (and possibly overland) at economic prices? In the meanwhile the comment may be ventured that it appears to have prospective value in war, either to carry goods above the sea and therefore beyond the reach of conventional torpedoes, or as an anti-submarine weapon offering the promise of qualities for that purpose different from and possibly superior to those of any existing form of ship or aircraft. We wonder under these circumstances whether the time has not arrived for the Admiralty to show a more direct interest in the development than it has shown so far. The resources available to the National Research Development Corporation have been sufficient to carry development forward far enough to demonstrate conclusively the practicability of the device. But if really rapid further progress is to be made it may well be that more ample resources will be required.

CAN WE AFFORD IT ?

We are all very fond of claiming, sometimes ruefully, that we cannot afford to buy something. The fact that, when challenged as to why we do not buy something, we sometimes use the term 'afford' almost with glee, makes clearer what our real meaning is. What we really mean is that we prefer to spend the money on something else. Women understand this situation much better than men. For when Father declares with finality that, say, a holiday cannot be afforded this year, no mother worthy of her family will fail to reply that if only he will cut down on his beer and tobacco and play fewer rounds of golf, there will be plenty of money to spare! However, Ministers of the Crown still often seem to suppose that it is an unanswerable argument to claim, when the Government refuses to make funds available for this, that, or the other purpose, that the country cannot afford it. From the end of the war until a year or two ago, for example, a succession of Ministers of Transport (not one of whom, probably, believed it) had to claim, at the behest of the Treasurer, that this country could not afford to spend more than a pittance upon reconstructing the railways, or building new roads. They had to make that claim at the very time when certain countries on the Continent, whose economic situation was worse than Great Britain's, were happily engaged upon spending very large sums of money on improving transport!

It might be supposed, therefore, that we should be irritated when we hear another Minister excusing lack of expenditure by claiming that the country cannot afford it. But, in fact, far from it. We are greatly encouraged! For, within the family circle, once Father is unwise enough to claim that he cannot afford something, he lays himself open, as Mother is quick to perceive, to counter attack, and he soon finds himself desperately defending his customary expenditure upon other things. Thus, when, on June 25 Mr. Bevins, Parliamentary Secretary to the Ministry of Housing and Local Government, referred to the growing public opinion against river pollution but claimed that "without putting impossible strains on the economy" the capital investment programme could not be stretched beyond an authorised expenditure of £33 million last year for the improvement of old and the construction of new sewage plants we knew exactly where we were. Not long ago the Minister of Transport was making much the same kind of claim. Expenditure on road development has since substantially increased! It is, indeed, all very encouraging. We can now dare to hope that very soon expenditure upon cleaning up this country's rivers will likewise increase.

INDUSTRIAL SAFETY

The Chief Inspector of Factories is required to present to the Minister of Labour two annual reports. One of them deals with the general work of the factory inspectorate and the other is concerned specifically with health in industry. Both reports for the year 1958 were published last week. Although factory inspectors are required to deal with a variety of matters arising from the provisions of the Factories Acts, the most significant part of the chief inspector's general report continues to be that which deals with accidents, accident prevention and standards of safety. Last year there was a reduction of over 4 per cent, compared with 1957, in the number of accidents reported and the total accident figure, 167,697, was, in fact, the lowest to be recorded since 1935. It could be argued, of course, that the slight recession in the rate of industrial activity last year accounted for the improvement. But in those establishments classified as factories it is evident that the efforts made to achieve higher standards of safety are proving their worth. Unfortunately, the same downward trend is not shown in the accident figures for building operations and engineering construction work. Although last year's overall total was lower, there were increases in both these classifications, the majority of the accidents being caused by falling. The figures, the chief inspector remarks, are disappointing and "clearly show the need for more positive action by the industries concerned." The chief inspector goes on to emphasise the value of training young people in the principles of accident prevention as part of their technical education. He is convinced that "a young person armed with such basic knowledge on entering industry will in due course make a valuable contribution not only to his own safety but also to the safety of others with whom he comes into contact." Undoubtedly that is so. At the same time, it must be realised that safety consciousness is not something that can just be taught. In the main, it derives from plain common sense. Unfortunately that is a quality quite often conspicuously absent even amongst highly intelligent people.

BRITISH SATELLITES & ROCKETS

The news recorded below that an advantageous agreement has been reached with the Americans for the launching, in American rockets, of British satellites for undertaking space research, must unquestionably be very satisfactory to scientists in this country and it will give satisfaction, too, to instrument designers and makers. The arrangement may well prevent the development of a flow of young scientists interested in space research work, from this country to the U.S.A. For there must be an immediate (and no doubt continuing) expansion in the number of scientists in space research teams in this country. But the influence upon engineers is much less certain. Reference was made in the statement by the Lord President of the Council to the continuance of a design study into the project for putting a British satellite into orbit with a British vehicle. While it is true that much work remains to be done on such a study that study is not likely to prove particularly attractive to younger engineers interested in rocket engineering unless there is a reasonable certainty that it will lead to an actual firing! However, the arrangement with the Americans does not, it seems, mean that there is to be any slowing down of plans for developing the British Blue Streak rocket the first firing of which should surely take place within the next few months. What it does seem to mean is that it can now be developed solely with military objects in mind; that, in fact, though there will be less sense of urgency to develop quickly a civil version for space research, there may be greater effort exerted to press on with the military version. There may be an improved outlet here for younger British engineers wanting to get experience with large rockets; but unfortunately, of course, the work has to be done under a cloak of secrecy, always a situation somewhat frustrating to younger men desirous of establishing a reputation for themselves. The United States may therefore continue to act as a magnet for younger rocket engineers, more particularly now that the National Aeronautics and Space Administration is really getting to work. For that body is in principle non-secret though it will have to abide by any secrecy imposed upon any rockets which it may use as stages of its 'Scout' vehicle or any other vehicle it may devise.

BRITISH SPACE TRAVEL

In answer to a question in the House of Lords on July 29 the Lord President of the Council said: "In accordance with the Prime Minister's announcement on 12th May, 1959, Professor Massey and a small team of experts visited the United States recently to discuss co-operation with the United States in the field of scientific research in space using earth satellites. I am glad to report that Professor Massey's team had most valuable and fruitful discussions with the National Aeronautics and Space Administration (N.A.S.A.). As a result, it is proposed that British scientists will prepare instruments, for satellites to be placed in orbit by the use of the 'Scout' vehicle, which N.A.S.A. are developing for use in connection with civil scientific research. Thus British science will be able to play its own part in the advancement of scientific knowledge of our planet and its environment. Several vehicles might be involved over a period of three to four years. Her Majesty's Government have considered and approved these proposals, subject to the conclusion of formal arrangements. Information concerning these programmes and their results will be made available to the international scientific community. Both the British and the American groups regard this project as a valuable development in scientific co-operation, and in endorsing this view on behalf of Her Majesty's Government I would like to congratulate both sides on the successful outcome of their discussions. Meantime the arrangements for design studies of British launchers, which were announced in the Prime Minister's statement, remain unaffected."

The "Scout" vehicle referred to in this pronouncement is expected to be ready to carry satellites into space in about two years' time. It is a device based upon a combination of a number of known rocket vehicles and may turn out to have either three or four stages. All stages are expected to have solid fuel propellants. It is designed to be capable of putting a satellite weighing about 150 pounds into an orbit 300 miles above the surface of the earth or satellites of lesser weight into higher orbits. The payload, of course, includes the weight of batteries, radio-equipment, etc.; so that some substantially lesser weight of actual research instrumentation could be carried. Batteries, radio equipment, etc., would be supplied by the Americans who have suitable equipment already available. The instruments will all be designed and made in Britain and there will be no mixture of American and British research equipment in any one satellite. The volume within a satellite is likely to be about equivalent to that of a cylinder 20 inches diameter by 20 inches long though, no doubt, differing shapes will be possible according to the needs of the particular research equipment to be installed. Each satellite should be capable of carrying enough equipment to conduct about three separate research experiments.

The cost of the rocket vehicle, all its American equipment, and its firing will be wholly borne by the Americans. Only the cost of the research instruments will fall upon Britain. Hence the cost to the United Kingdom of a research likely to result in the setting up of about three British satellites within four years from now will be limited to £100,000 or £200,000 per year. It is conceived that the programme of "Scout" firings will extend over two years once the vehicle is ready. The rockets will be launched from Wallops Island in Virginia or from California, depending upon the desired orbit, and British scientists will be present at each firing of a "Scout" carrying a British satellite.

It is expected that a number of teams of scientists interested in particular researches will be formed within a year in Britain. There may be as many as ten and each may consist of about five men of university degree standard or higher, plus assistants. Each team, in conjunction with manufacturing firms, will design sets of instruments suitable for carrying out a particular research. Instruments after manufacture will need to undergo a series of tests on the ground, culminating in a vertical ascent into space to ensure that they operate satisfactorily beyond the earth's atmosphere and can stand up to the conditions ruling during launch. The British "Black Knight" rocket could be used as the vehicle for this purpose. It is expected that the interval of two years before the "Scout" is ready will prove no more than just sufficiently long for all this work to be done. Some "possibles" amongst the particular researches that may be chosen include work upon the ionosphere, solar and other radiations from space which cannot penetrate the atmosphere, meteorology, radioactivity in space, meteorites, etc. There will be a degree of co-operation with the Americans to avoid as far as possible duplication of experiments; but not with the Russians who do not habitually appear to publish full information to the world. The results of all British work would be published to the world.

Observations of and recordings from British satellites will be available from American stations, British stations, including that of the Radio Research Board at Slough, and such stations as that at Ibadan in West Africa.

The Engineer—100 Years Ago (AUGUST 5, 1859)

"THE ROYAL AGRICULTURAL SOCIETY"

"Not the least interesting and suggestive feature of the Warwick Show was the groups of curious and inquiring visitors which were to be seen round some of the most important or novel implements in the showyard, engaged in eager discussion of their respective merits and defects; each agriculturist stating his own views and experience for the benefit of others. In this respect, the exhibition, even if it accomplished no other purpose, must have been of great service. During the time the trials of steam cultivators were going on, discussion appeared to be held in every inn parlour in Warwick as to the relative merits of the different systems. Wherever we went, the constant subject of conversation was steam power, and the best mode of applying it.

"There is something very hopeful in the fact of agriculturists taking such an interest in mechanical subjects, for without the practical knowledge which they only can supply, the engineer and the implement-maker would be very much in the dark as to the requirements of agricultural mechanism. There is a wide difference between the tools of a machine shop and those employed in the cultivation of the soil, or in the preparation of its products. The conditions to which agricultural tools must be adapted are so various and uncertain that anything approaching to precision in their construction and arrangement is altogether out of the question. A planing or shaping machine has only a definite purpose to fulfil; a plough, harrow, or reaping and mowing machine has to be adapted to very varying and uncertain conditions of soil, season and crop. It is, no doubt, this variety of conditions which renders necessary the great diversity of form and arrangement in implements intended for the same general purpose."

Atomic Energy Establishment, Winfrith

Fig. 1—No. 2 zero-energy reactor hall, general services building and apprentices school at Winfrith Atomic Energy Establishment, March 1959

IT is less than two years since work first began on the site of the Atomic Energy Establishment at Winfrith, Dorset, and the Press visit to the site last month gave us an opportunity of seeing something of the progress made with the building of the establishment. One of the two reactor buildings envisaged in the initial installation is nearing completion, as is the first reactor in it. This reactor ("Zenith") is a zero-energy system which is being built to operate under temperature conditions similar to those expected in a high-temperature power reactor and will be used primarily to determine some of the important parameters in the "Dragon" experiment which, it is hoped, will provide the basis for a further stage in the development of the gas-cooled graphite-moderated power reactor. Already the properties of the proposed reactor core arrangements for "Zenith" are being studied in "Zenith" exponential experiments.

The Winfrith establishment is being set up specifically to study new ideas and provide basic design data for application to power generation. It will work closely with Harwell where the research and basic development work on the chemical metallurgical and nuclear physics subjects will be centred.

At Winfrith the first concern will be with the physics and engineering development work leading up to, and including a reactor experiment or a small prototype system. The stages in the development will include theoretical feasibility studies; basic reactor physics studies using non-cubical and critical assemblies of fissile and moderator materials but without the release of significant amounts of power; the development of materials including irradiation and corrosion studies; the development of control and instrumentation systems; and the solution of engineering and design problems. If the results of this work show that a reactor experiment may be promising then the Winfrith establishment will work out the engineering design of a system to operate at about 1 to 10 MW and will build the reactor experiment.

The site is about 5 miles north of West Lulworth and 1 mile west of Wool station, Dorset, and the area that is being developed initially measures about 1½ miles by 1 mile. In it there are about six possible sites for reactors arranged around a central group of buildings which will include two zero-energy halls, reactor group offices, a general services building, a central technical building and an apprentices school. Progress on the eastern half of the site is shown in Fig. 1.

On the left is the completed zero-energy reactor hall No. 2 which houses "Zenith"; to the right of that are the works for No. 1 reactor hall and linking these two reactor halls is the zero-energy administration block. In the centre background is the general services building and beyond that is the apprentice training school, an H-shaped block with workshops on the right and lecture theatre and gymnasium on the left, linked by an entrance hall and administrative suite.

"Zenith" Exponential Experiment

The object of this series of exponential experiments is to determine the properties of the reactor core arrangements which will later be loaded into "Zenith". The rig consists of a roughly cylindrical assembly of fuel elements for "Zenith". Each fuel element consists of a series of graphite sleeves joined end to end, and packed with discs of thorium oxide, uranium oxide and graphite. The amount of fuel is sub-critical (less than that required to maintain a chain reaction). To generate a neutron flux in the fuel, four radium beryllium neutron sources are mounted radially and symmetrically in the graphite pedestal that supports the fuel element stack.

The observed neutron flux in this arrangement decays exponentially with height (hence the term exponential experiments). Measurements are made of the rate of change of neutron flux with height, for a number of different assortments and patterns of discs of thorium, uranium and graphite in the sleeves and the results are compared with the theoretical forecasts.

The neutron flux measurements are made with metal foils and boron trifluoride counters inserted in the spaces between the fuel elements: irradiation makes the metal foils radioactive and the neutron flux is calculated from measurement of the induced radioactivity.

A general view of the rig is reproduced in Fig. 2.

"Zenith"

"Zenith" as mentioned above is a zero-energy reactor designed to operate under temperature conditions akin to those anticipated in a high-temperature power reactor. It enables power reactor design studies to be made at high temperatures and avoids the limitations involved in attempts to extrapolate from studies made with zero-energy reactors operating at room temperatures. Moreover "Zenith" has the advantage that the high operating temperatures are produced by external heating (250 kW) whereas the operating power, merely 100 W maximum, although sufficient for the nuclear physics measurements, is so low that the activity level in the fuel is not enough to hinder the operation of rearranging the core.

The core consists of 235 rods arranged in a nearly cylindrical lattice about 5 ft. long and 4 ft. in diameter (Fig. 3). The fuel elements resemble those of the "Zenith" exponential experiment but differ in having their ends made of solid graphite. These ends, together with the 3 ft. thick graphite annulus around the fuel constitute a reflector to reduce neutron escape and fuel.

Nitrogen gas is circulated through the core from an external circuit installed in a pit below the reactor vessel. A 250 kW heater below the core heats the nitrogen and raises the core temperature to 800 deg. Cent. Cool nitrogen is introduced through a by-pass into a manifold at the top of the core and mixes with the hot gas before passing downwards through the reflector which is kept at a maximum temperature of about 400 deg. Cent.

To avoid chemical reaction with the carbon it is essential to maintain the purity of the nitrogen gas at the operating temperatures concerned. A purification plant is installed to remove traces of CO and CO_2, limiting the impurities to 1 p.p.m., working in conjunction with gas analysis equipment. The gas circuit includes a gas/water/cooler which can be by-passed if required. A waste heat ventilation system is incorporated and is designed to keep the ambient temperature down to 100 deg. Fah. in the plant room.

The instruments used for core experiments are fitted at the inner edge of the reflector and the core is surrounded by a ring of 30 control rod holes. There are four classes of control rod, providing for "scram", shut down, coarse control or fine control. With the exception of the latter which can be positioned intermediately, each rod must be either "in" or "out". All the reactor controls and instrumentation are centralised in a control room on the same floor level as the steel containment bonnet (14, Fig. 4) and adjoining it.

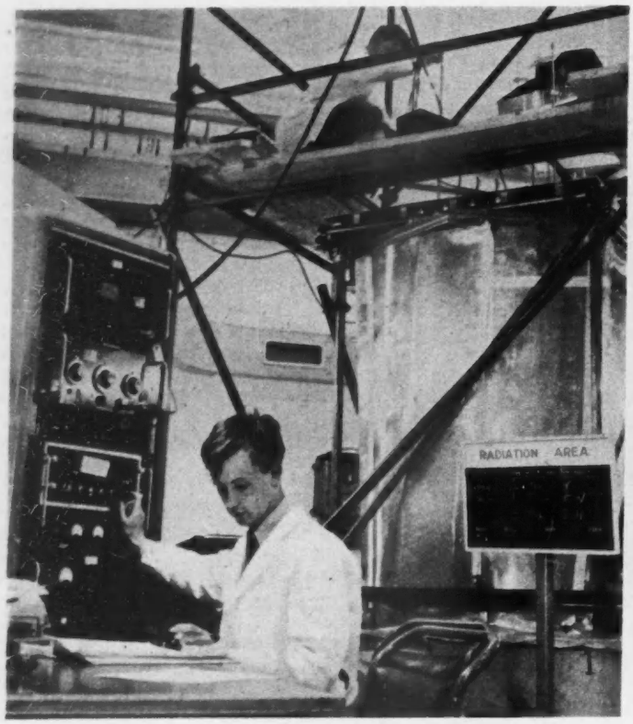


Fig. 2—Exponential experiment on the physics of the "Zenith" core

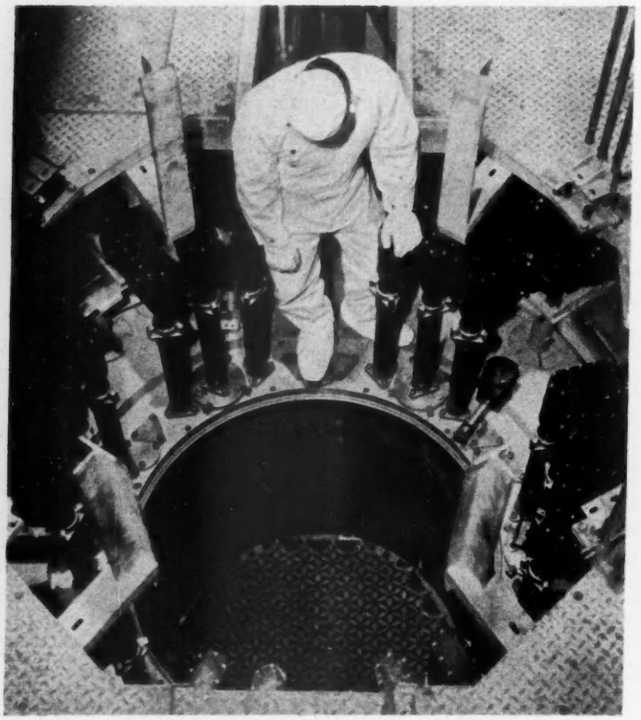


Fig. 3—Top of core of "Zenith" reactor during erection, June 1959

"Zenith" is roughly similar in size and configuration to the 10 MW high-temperature gas cooled reactor experiment that is being built at Winfrith as part of the "Dragon" project described below. Initially the programme of work done on "Zenith" will be concerned with evaluation of important parameters in the design of the "Dragon" reactor experiment. Control problems, temperature coefficients and critical sizes will be matters of immediate interest. Measurements of neutron spectra and effective cross sections will help to refine calculations of effects (such as fission product absorption) which cannot be observed directly on "Zenith". When this work (which will be on a rental basis) has been done "Zenith" will be used for research in connection with the Authority's long-term research programme on high-temperature systems.

"Dragon"

The O.E.E.C. high-temperature reactor project known as "Dragon" arose out of discussions which took place under the guidance of the European Nuclear Energy Agency of the Organisation for European Economic Co-operation. Six countries—Belgium, France, Italy, Luxembourg, the Netherlands, and Western Germany are participating through Euratom, the other partners in the enterprise being Austria, Denmark, Norway, Sweden, Switzerland and the United Kingdom. The agreement provides for a joint project concerning high temperature gas-cooled reactors with headquarters in the United Kingdom at the Atomic Energy Establishment, Winfrith, and covers a period of five years, from April 1st, 1959.

The expenditure on this joint project over the five-year period may amount to as much as £13.6 million.

The objectives of the joint project are twofold, namely to carry out a programme of research and development work on high-temperature gas-cooled reactor systems and to design, construct, and operate a reactor experiment embodying the results.

The reactor experiment proposed for the joint project was described in a paper presented at the last Geneva conference (The Engineer, March 13, 1959). The fuel elements are cylindrical and consist of an "impermeable" graphite can containing the fuel inserts. Helium coolant removes the heat from the core under pressure. In the heat exchanger the heat is removed from the hot gas (800 deg. Cent.) and rejected to the atmosphere, while the cool gas (350 deg. Cent.) is pumped by the circulating fans around the inside of the pressure vessel back to the reactor core to complete the circuit. As it is not at the moment possible to make a completely impermeable graphite can, provision is made for having an inward leakage of helium (into the fuel element can) which is then passed through a fission-product trap and returned to the circuit. This keeps the activity of the main coolant circuit as small as possible.

The main technological problems of this kind of reactor are the development of suitable materials for use at high temperatures, both in the fuel elements and in the other parts of the reactor. These technological developments have to be tested under irradiation conditions and obtaining the necessary facilities is one of the major problems of the project. Both in this field and in other phases of the research and development work it is intended to make as much use as possible of facilities in Europe, including "Zenith", as indicated above.

To expedite studies of proposed reactor systems from the very early stages extensive use is made of a "PACE" computer (Pace Analogue Computing Equipment) an American equipment made by Electronic Associates Inc.

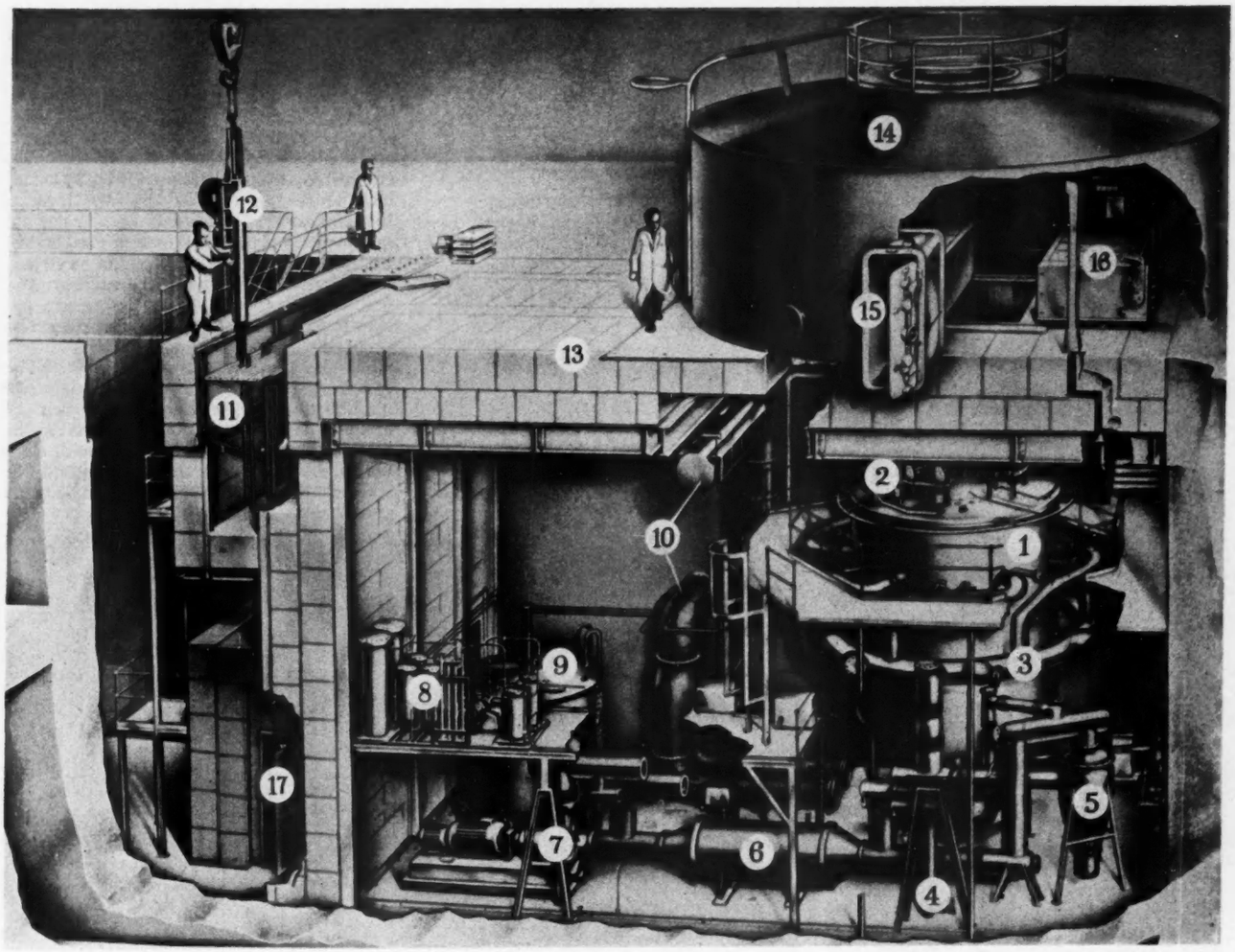
Future Programmes

In two or three months' time it is proposed to move from Harwell to Winfrith the team of physicists, mathematicians and engineers who are doing basic work in connection with the industrial nuclear power programme. This staff works closely with the Authority's northern groups, with the consortia which are building nuclear power stations in this country, and with the two generating boards in Great Britain who place orders for nuclear power stations. Staff from the consortia will work with the Authority at Winfrith on the collaborative programme of long range investigations known as the "BICEP" programme which is being moved from Harwell. This work is part of the general programme for lowering the capital costs and improving the efficiency of gas-cooled graphite-moderated reactors. Beyond that it is proposed to develop ways of using as fuel, the plutonium that will gradually become available from the burning of uranium in the early nuclear power stations. For this, new experimental installations will be built at Winfrith, such as hot contained exponential assemblies and a source reactor to drive them. The design of this source reactor is now being studied. The basic studies on gas-cooled systems will also need a further zero-energy assembly, for which space is already available in the zero-energy halls.

Another large area of work which will be moved to Winfrith when space permits is concerned with exploring the possibilities of reactor systems which might be suitable for use under lower load-factor conditions than are the present large base-load power stations, and with the longer range possibilities of nuclear propulsion. Both of these objectives lead to study of reactor systems moderated with light or heavy water instead of graphite. There will also be basic and preliminary studies on boiling water reactors and steam-cooled systems, and some basic work on organic liquid moderators. A small nucleus of staff attached from the British Shipbuilders Research Association co-operates in some of these studies.

Effluent Disposal

Effluent from Winfrith is subject to two kinds of control. Radioactive content is subject to ministerial regulations (Ministry of Housing and Local Government and Ministry of Housing and Local Government and of Agriculture Fisheries and Food. The effluent also has to conform to the requirements of the Southern Sea Fisheries District Committee to ensure that the other proper-



1. Reactor vessel.
2. Control rod mechanism.
3. Nitrogen supply to reflector.
4. Nitrogen supply to heater.
5. Nitrogen filter.
6. Heat exchanger.
7. Nitrogen circulator.
8. Nitrogen purification plant.
9. Nitrogen gas holder.
10. Waste heat ventilation system.
11. Fuel element store.
12. Load unloading flask.
13. Concrete block shield roof.
14. Containment dome.
15. Air lock access to dome.
16. Shield trolleys.
17. Labyrinth entry to contained space.

Fig. 4—Diagram of "Zenith"

ties of the effluent are not harmful to sea fish or sea fishing.

To meet these requirements the Authority has completed an extensive research programme ("Operation Mermaid") to study the dilution and dispersion of effluent from various proposed discharge points. A joint technical working party, including representatives of the District Committee and the Authority, has been set up to determine satisfactory conditions for discharge of non-radioactive effluents. At the same time the Authority is supporting a programme of marine surveys and experimental work under Professor J. E. G. Raymont of Southampton University. Surface water and a small amount of purified sewage effluent from buildings in which no radioactive work is done will be discharged, by agreement, to the local rivers. All other wastes will be treated and discharged to sea. Effluents containing radioactive material will drain from buildings into delay tanks in which they will be held until the level of activity is measured. Depending on the activity level, the liquid will be pumped to one of three 200,000 gallon active sea-disposal tanks for batching and final analysis, or diverted to a treatment plant in which the activity level in the liquid will be reduced by chemical treatment. Non-radioactive effluents will be allowed to drain to local pump-houses and will then be collected in two 200,000 gallon non-active sea-disposal tanks. The necessary analytical work for effluent control will be done in the nearly-completed laboratory block in the effluent control area. This area will also contain plant for the storage and treatment of high-level waste, a decontamination centre for plant and equipment and a building for the processing and packaging of solid active wastes.

Two identical pipelines are being installed along a six-mile route to carry the effluent into the sea south of Arish Mell. Each pipeline is designed to handle the estimated effluent from Winfrith. Along the overland route each pipeline will consist of a pipe within a pipe: radioactive liquids will be carried in the inner pipe and other liquids in the outer annulus. A leak-free discharge of radioactive liquid should thus be ensured. Automatic monitors on the outer stream will detect any leak from the inner pipe. The pipes are of mild steel with all welds radiographed to Class I standards and surfaces coated to reduce corrosion. Impressed cathode-cathodic protection against corrosion will be applied to both land and sea sections.

The effluents will be pumped from the main site pumphouse to break tanks at the highest point of the route; from there they will flow by gravity to the discharge points. The break tanks consist of a tank within a tank, the inner one for the radioactive waste and the outer one for the rest (to correspond with the concentric pipe system). As the final part of the pipeline crosses the army gunnery range the pipes there will be buried at a greater depth to avoid damage.

The landward part of the pipeline will terminate at a reinforced-concrete valve pit on the foreshore. At this point the "concentric" pipes will end: thence the effluent will be carried in four pipes, two for radioactive liquid and two for non-radioactive. On the basis of exercise "Mermaid" the radioactive effluent will be discharged into the sea two nautical miles from the shore. The other effluent will be discharged 50 ft. beyond low-water spring tides. The seaward part of the pipe is welded into 1200 ft. lengths, surface protected, sheathed in concrete fitted with floats and stored ready for launching from a jetty which has been built at Arish Mell.

The main contractor for the construction of the Winfrith establishment is the Turriff Construction Corporation Ltd., Two contractors are responsible for the effluent pipeline: Constructors John Brown Ltd., and Taylor Woodrow Construction Ltd. in association with Collins Submarine Pipelines Ltd. The main contractor for the "Zenith" installation is The General Electric Company Ltd.

Southern Region Kent Coast Electrification

No. II—(*Concluded from page 39, July 31*)

Electric train services between London, Ramsgate and Dover (via Canterbury) were introduced with the summer timetable on Monday, June 15. This is the first phase in the programme of the Southern Region, British Railways, for extending electrification from its previous limits at Gillingham and Sevenoaks to the Kent coast and covers 68 route-miles of main line, together with the 8-mile branch from Sittingbourne to Sheerness. Electrification has been accompanied by improvements to track layout and widening, resignalling, the provision of new rolling stock and locomotives, and the complete recasting of the timetable to provide regular interval services.

Power Supplies

There are twenty-three rectifier substations at intervals of roughly 3½ miles along the newly electrified sections, and intermediate track-paralleling cabins with circuit breakers are provided to allow higher fault settings for the track feeder circuit breakers in the substations.

Substations are mainly of 2500kW capacity. The eight from Faversham to Dover have been equipped with glass bulb rectifiers by the Hackbridge and Hewittic Electric Company, Ltd., and consist of 2500kW units, each with sixteen bulbs. A two-unit (5000kW) installation of this type has been provided at Dover. In these substations, and in the eight track-paralleling huts on the same section, the a.c. and d.c. switchgear (Figs. 3 and 4) has been supplied by the British Thomson-Houston Company, Ltd.

The high-voltage switchgear is metalclad Class "MF.36," 33kV, 750MVA, exactly similar to the 106 equipments supplied by B.T.H. for the Southern Region change-of-frequency scheme from 1953 to 1957. Thirty-one equipments are involved in this phase of the Kent coast electrification.

Eighty-one high-speed circuit breakers have been supplied by B.T.H. The track feeder breakers are rated for 750V, 3000A d.c., and the rectifier breakers for 5000A. The track feeder breakers are an improved version of the type supplied for the change-of-frequency scheme, and the rectifier breakers are of a new latched design which retains the same characteristics as the magnetically held breakers, and are mounted in improved trucks. All the high-speed circuit breakers are mounted on trucks with rubber-tyred wheels, and have plug-in connections.

The fifteen substations between Gillingham and Ramsgate have been equipped by The General Electric Company, Ltd., with rectifiers and high-voltage switchgear, both of similar design to those supplied by the company for the change-of-frequency scheme. Rectifiers are pumpless, air-cooled steel tank units installed as 2500kW assemblies of four cylinders each. Two substations (Broadstairs and Queenborough) are equipped to have 5000kW installed capacity. The d.c. circuit-breakers at all these substations have been supplied by Bertram Thomas (Engineers), Ltd., who also equipped the track-paralleling huts on this section.

Power supplies for the whole of Phase 1 are controlled from a remote supervisory control room at Canterbury (Fig. 5). This installation was supplied by The General Electric Company, Ltd., and is a d.c. impulse system generally similar to that used in the London area control rooms at Raynes Park, Selhurst, and Lewisham, but embodying a few simplifications which experience has shown to be practicable without any loss of necessary facilities, and with a gain in reliability and ease of maintenance. The system is characterised by the small size of the discrepancy keys, which can be mounted at 1in centres and can therefore be located on the power network and track diagram in positions corresponding to the actual sites of track feeder circuit-breakers even on four-track sections. At the same time, the diagram can be confined to one plane and need not be much over 7ft in height, with advantage to the natural and artificial lighting of the room.

The contract for the cabling, valued at £750,000, was awarded to W. T. Henley's

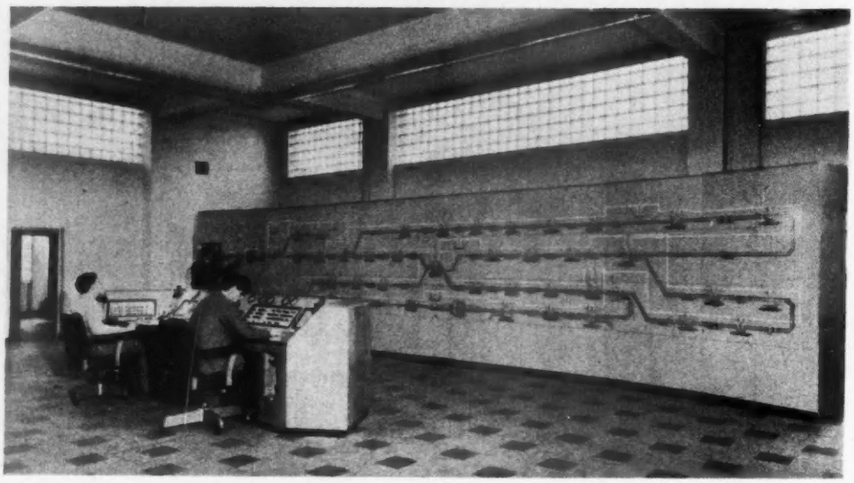


Fig. 5—Remote supervisory control room at Canterbury for controlling power supplies on the Gillingham—Ramsgate and Faversham—Dover sections

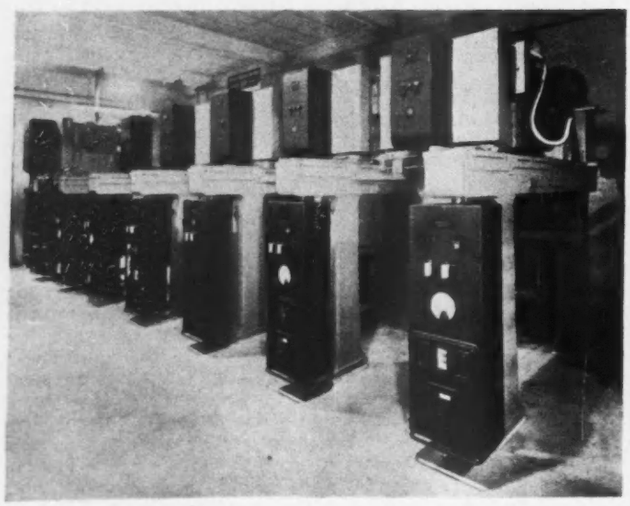


Fig. 3—High-voltage 750MVA metalclad switchgear controlling 33kV supplies at Canterbury substation

Fig. 4—High-speed circuit breakers at Canterbury substation. Rectifier breakers on left and track feeder breakers on right

Telegraph Works Company, Ltd., who, in two years from April, 1957, supplied and supervised the laying of 88 miles of 33kV, three-core oil-filled cable and 90 miles of pilot/supervisory cables. Most of the cable laying has been done by night. The major part of the cable was laid into surface concrete troughing ; where walls and bridges intervened along the route, asbestos-cement tubing was used to accommodate the cables, and track crossings were made through buried asbestos-cement ducts. At platforms, the concrete troughing was installed below the platform surface.

Interesting sections of the route were those at Selling Tunnel (between Faversham and Snowdown Colliery), where a very narrow tunnel obliged the engineers to take the cable over the top of the hill, through orchards, to join the track again where the tunnel emerged from the opposite hillside. The cables over this section were single-wire-armoured and laid direct. In the other tunnels, however, the cables were accommodated in the normal surface concrete troughing and the necessary oil-pressure tanks were housed in recesses in the tunnel wall.

Low-oil-pressure indicating switches are installed to give warning of any fall in pressure on the oil-filled system. These switches trigger-off visual warnings at the substations, the alarm also being routed back to the main control room at Canterbury.

Four supply points bring power from the 132kV grid : the supply is transformed down to 33kV at Central Electricity Generating Board supply points at Sittingbourne, Canterbury, Thanet and Folkestone. From these locations it is conveyed to the British Railways substations where it is transformed and rectified to 750V d.c. for the traction circuits. A fifth 33kV supply point is provided as a standby at the Queenborough substation of the South Eastern Electricity Board.

The cables at the substations and supply points were protected by hand-applied fire-proofing. The earthing at all these substations was carried out by Henley's, and some 2500 yards of copper strip was used for this purpose. The numerous boxes in which the pilot cables terminated at the substations were of Henley manufacture, as were the joints used throughout the contract.

Rolling Stock

Train services are operated mainly with multiple-unit sets. The fifty-three sets built at Eastleigh for express services are four-car units (Fig. 6), forty-three of which comprise two motor second brakes with saloon seating (fifty-six passengers each), a corridor second with eight compartments seating sixty-four passengers, and a corridor composite with four first-class compartments (twenty-four passengers) and three second-class compartments (twenty-four passengers). In the other ten sets a buffet car replaces the corridor second trailer. This vehicle contains a dining compartment seating seventeen passengers, kitchen, and bar and buffet section with four seats. The electric oven range operates on a 200/250V d.c. supply. The oven ranges have been supplied by The General Electric Company, Ltd.

Fast trains are operated in formations of up to twelve coaches, generally running as one train from London to Gillingham, where the Ramsgate and Dover portions are separated. A description of the English Electric camshaft controller (Fig. 7) and other details of that company's traction

Fig. 6—Four-coach set of the new express rolling stock

equipment, both in the express and the sixty-two two-car sets for stopping services (which also can operate in twelve-car formations) appeared in our June 5, 1959, issue. The motors are of the same power as those of the 1956 express units and give the same level balancing speed of 72 m.p.h., but the acceleration rate has been raised slightly, partly to ensure satisfactory performance on the 1 in 30 gradient of the Folkestone Harbour branch, which will be electrified in the second phase of the present scheme.

The overall cost of the traction equipment in the express sets has been substantially reduced as compared with the earlier units, one of the principal contributions to this having been the provision of only one motor generator set and battery per unit instead of one per motor coach. Nevertheless, it will still be possible to interchange motor coaches if necessary by making fairly simple modifications.

A number of other changes have also been made to reduce wear and improve comfort. The bogies are identical with those of the

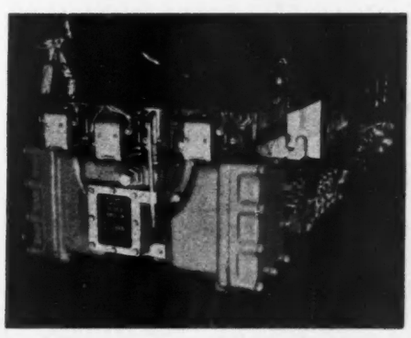


Fig. 7—Controller on motor coach underframe, showing vane motor which drives camshaft

Hastings diesel-electric units, having been fitted with lateral shock absorbers, shear type rubber auxiliary springs and rubber bonded spherical bearings for the bolster swing hangers. The gangway stems are now rubber-mounted and the gangway faceplates are lined with anti-friction material to eliminate the need for periodical lubrication, which previously necessitated the separating of the coaches of units every month. These changes are being made to the older express units as well.

The thirteen 2500 h.p. electric locomotives described in our February 13, 1959, issue have been working the " Night Ferry " London–Paris sleeping car train between London and Dover in both directions since June 9, the route of the down train having been changed from the Tonbridge to the Canterbury line to make this possible. Their other duties are on inter-regional passenger trains formed of steam stock, summer relief passenger trains to the Kent coast resorts, some van trains, and heavy trunk freight trains. Overhead wiring is in progress in certain sidings and yards to enable the locomotives to operate there by using their pantographs, so dispensing with the need for a live rail in these areas, where staff have frequently to be on the track during shunting.

Motor luggage vans equipped for live rail running or battery manœuvring are being built for use in connection with boat train services, where Customs requirements call for vans to be moved over quayside lines without a live rail supply. Such a van may also form the leading vehicle of a multiple-unit boat train running to London, where it is necessary for the registered luggage to be unloaded at the head of the platform, beyond the Customs barrier.

Inaugural Journey and Luncheon

Some 200 guests of the Southern Region travelled in the first electric train to Margate on June 9, before public services began. An inaugural luncheon was held at the Winter Gardens. In proposing the toast, " Another Part of British Railways Modernisation," Mr. G. R. H. Nugent, Parliamentary Secretary, Ministry of Transport and Civil Aviation, said that to-day much traffic which once, of necessity, went by rail now went by road, and that was why the railway system, as well as being modernised, was being streamlined. In this change of balance between road and rail in our national life, it was absolutely clear that there was only one way to carry the huge numbers of people who daily travelled into our cities, and that was by rail. Freight had traditionally been the bread and butter of the railways, but now the balance was changing. The trend of freight services continued downward, but passenger services still showed a slight forward trend. These services were no longer the " little brother," and the very large commuting public must realise that the world had changed and must see passenger fares in that light.

Sir Brian Robertson, chairman of the British Transport Commission, said, in his reply, that now this stage of the scheme was finished the Southern Region would transfer its resources immediately to the next stage of the Kent coast electrification.

Sir Philip Warter, chairman, Southern Area Board, said, in proposing the toast

of "The Kent Coast Resorts," that people working in the Medway towns would now be able to commute to the Kent coast. They intended by cheap fares and other inducements to raise their traffic in off-peak hours by 50 per cent, and with the help of all kinds of attractions to travel they expected to achieve full use of their rolling stock at week-ends and, hence, a good return on the investment in it. He thanked all the representatives of contractors present for their co-operation. The only way to do the job had been to get the best of British industry to co-operate with them.

Alderman Gordon A. Kirby, Mayor of Margate, responded to the toast and presented locally-made models of the new rolling stock to Sir Brian Robertson and Sir Philip Warter.

The inaugural train returned from Margate to a schedule of 1h 49 min (fastest time in the new service is 1 h 26 min from Cannon Street). Both in smooth riding and silent running the coaches showed notable improvement over some previous multiple-unit main-line stock, and when travelling in one of the second-class saloons marshalled intermediately in the train there was no increase in noise or movement to remind the traveller that these are motor coaches.

Warren Spring Laboratory

A new laboratory of the Department of Scientific and Industrial Research was opened at Stevenage, Herts, on June 29 by Lord Hailsham, Lord President of the Council. This establishment has taken over two programmes of the former Fuel Research Station at Greenwich, but its activities are extensive, the terms of reference under which it was set up being "to carry out process research and development over a wide field not limited to particular areas of technology." A description of the buildings and of the programmes in hand follows.

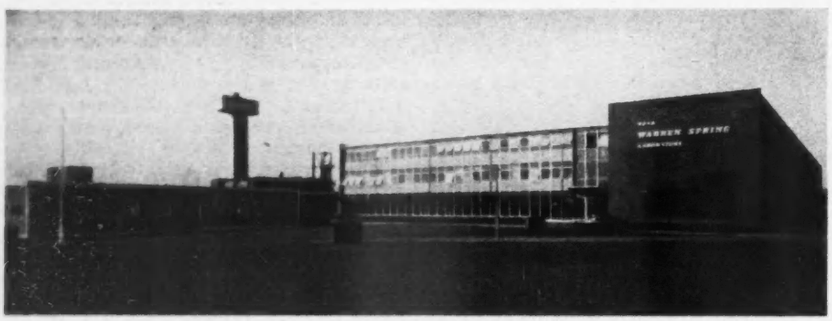


Fig. 1—Laboratory buildings and administrative block (on right)

WARREN Spring Laboratory (Fig. 1) is built on a site at the southern end of Stevenage New Town Industrial Estate. Formerly the site was crossed by Warren Spring Lane, and the choice of a topographical name for the laboratory emphasises the fact that the establishment is not tied to a particular line of research, and is not a continuation of the Fuel Research Laboratory in new surroundings. Only two of the Greenwich programmes have, in fact, been transferred there.

The three-storey main laboratory block is 372ft long and 37ft 6in wide. An administration block, also of three storeys and similar in construction and design, but of lower ceiling height, runs at right angles to the main laboratory building at its eastern end. The principal entrance hall and staircase are located at the point of junction between the two.

Demountable transverse partitioning in the main laboratory can be placed in any desired position between the outer walls and inner corridor walls, subject only to limitation by the basic 4ft module. The flexibility of space-division thus afforded is enhanced by the eccentricity of the spine corridor, which gives room depth in the laboratories of 18ft on one side and 13ft on the other. Ceiling height in the laboratories is 10ft 6in. Corridors have a false ceiling height of 7ft 6in to afford space for service runs.

As a corollary of flexibility of partitioning, laboratory benches can be readily removed and re-positioned where required. Service connections to and from benches are available at every third module (12ft) along the perimeter distribution system. Benches are normally arranged in peninsular fashion, i.e. at right angles to windows. They consist of a central timber-framed core unit, carrying its own set of service spurs; against one or both sides of this core are placed the working bench tops, with cupboards, drawers and knee space below.

Fume cupboards are ranged along the inner fixed (corridor) wall, and provision is made for the introduction of additional fume cupboards and services, as required, within predetermined limits. Extract ducts are carried up vertically from each fume cupboard to discharge above roof level within protective open-sided housings. The building is heated by panel radiators. Matching dummy panels are inserted between the radiators themselves to give the appearance of a continuous radiator panel between the concrete columns at 12ft centres. Radiators are thermostatically controlled.

Three pilot-scale laboratories are arranged as wings to the main laboratory. Each is 90ft long by 55ft wide by 37ft 6in maximum height. These buildings are linked to the main laboratory block by a corridor with small-scale laboratory units on each side. The buildings have folding doors to the side bays to allow the introduction of heavy plant at any point.

To the south of the main and pilot-scale laboratories are the workshops, garages, storage facilities, boiler-house, gas producer plant and electrical substation. A separate canteen building is provided for staff, and a small gate-house completes the scheme as at present developed. All these buildings are capable of up to 100 per cent extension laterally; in addition, the main and pilot-scale laboratories could be duplicated to the south of the workshop group.

In the main laboratory and administration buildings all vertical posts are in reinforced concrete precast in one length on site, and hoisted into position by crane. The posts are "shouldered" at connections with *in situ* floor and roof slabs, and are holed to allow threading of reinforcing bars. Floor and roof slabs are of "plate" form, which presents a clear under-surface throughout. In-filling panels below windows are light-weight concrete-faced with exposed stone aggregate. The windows themselves in the laboratory block are steel-framed, double-glazed. The administration block is of similar construction and design, except that windows to the ground floor library are timber-framed.

Workshops (Fig. 2) are steel-framed with

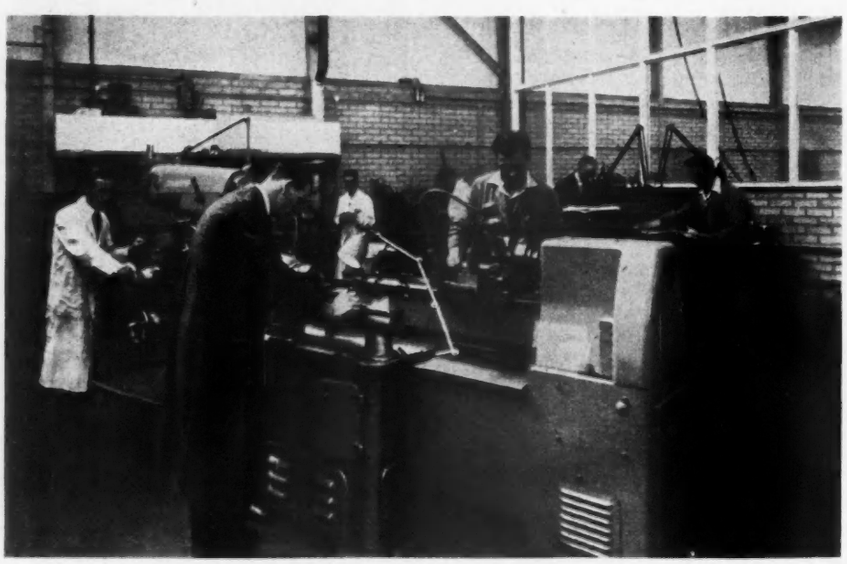


Fig. 2—Machine shop in the engineering services division at the laboratory

asbestos-cement wall cladding above the 9ft protective brickwork. The boiler-house group is constructed with concrete frame and roof, brick end walls and side cladding of asbestos-cement and patent glazing.

Finishes throughout have been kept as simple as possible for reasons of economy. The use of plaster to fixed wall surfaces has been largely avoided, self-coloured fair-faced brickwork being used generally throughout.

A large mural in inlaid wood, brought from the former Fuel Research Station at Greenwich, and depicting episodes in the history of coal, has been re-erected on one of the walls of the conference room in the administration block.

Floor finishes in the main laboratory and administration blocks are generally in linoleum ; granolithic finish is used for pilot-scale laboratories, stores, &c., whilst synthetic wood block is provided in workshops, as a precaution against damage to tools.

The main building contractor was the Turriff Construction Corporation, Ltd., and the layout and buildings were designed in the Chief Architect's Division of the Ministry of Works : senior architect, Mr. Morris Williams, A.R.I.BA., A.I.L.A.

Engineering Services and Plant

Steam is used by the laboratory for process work, particularly in connection with the production of gas for use in the Fischer-Tropsch process for catalytic conversion of a gas mixture into oil products. In order to meet the requirement of a steam supply night and day throughout the year, a fully automatic oil-fired boiler plant with a nominal pressure of 120 lb per square inch is installed. There are two John Thompson " Super-Economic " boilers, one rated at 10,000 lb and the other at 5000 lb of steam per hour. Space is left for a third boiler of either 5000 lb or 10,000 lb per hour capacity, and the existing smaller boiler could be changed to a larger size if site developments so demanded.

The fuel oil used is extra heavy grade (3000 seconds Redwood Scale No. 1). Two oil storage tanks are installed, each of 50 tons capacity, unlagged and unheated apart from an outflow heater. The tanks are situated outdoors in a bunded enclosure. Air for combustion is taken through the underfloor blow-down pipe trench from outside the boiler-house to a point underneath each boiler. An adequate supply of air is, therefore, provided irrespective of whether the doors and windows are open, and this obviates discomfort to the boiler-house staff from draughts. The front of the boiler-house is fully glazed with a patent method permitting ready removal in sections in the event of boiler tube replacements becoming necessary. The cost of the boiler-house was, therefore, reduced by permitting a smaller dimension from front to rear. The complete boiler-house installation was supplied by John Thompson (Wolverhampton), Ltd.

The gas plant was erected by Humphreys and Glasgow, Ltd. Synthesis gas is produced at a rate of 4500 std. cubic feet per hour in a standard water gas generator. There are arrangements for feeding carbon-dioxide with the steam so as to vary the hydrogen/carbon-monoxide ratio between 1·15 and 0·6. The gas is purified from hydrogen sulphide in Gastechnik towers and washed with caustic soda to control the carbon-dioxide content. It is then compressed to 15 atmospheres pressure in the first two stages of a four-stage compressor, passed through active carbon scrubbers to remove organic sulphur compounds, and then further compressed to 120 atmospheres in the third and fourth compressor stages.

The estimated electrical demand of the laboratory in its present stage is 500kVA, but the substation is designed to permit an increase in capacity of up to 1500kVA. A 100kW mercury-arc rectifier is installed for providing d.c. for the site at 220V. The incoming electricity supply is at 11,000V, 50 cycles, three-phase, and is transformed to 415/240V. The Eastern Electricity Board has made arrangements for the substation to form part of its ring main, thereby making it possible to provide an alternative supply to the site in the event of cable breakdown or other emergency.

The pilot-scale laboratory building is in effect a large enclosure capable of dealing with a wide variety of research work. The whole volume of the building is required to be available for the erection of the pilot scale experiments with minimum interference from heating or other services. With due regard to this and to the fact that large outside doors might be left open it was decided that radiant heating panels should be installed close under the roof to run the whole length of the building, using steam direct from the boiler-house, but at a reduced pressure and thermostatically controlled. The lighting fittings are arranged to be accessible from the hand-operated cranes. Busbars for a.c. and d.c. are provided in one part of the building and the equivalent cabling in pressurised conduit elsewhere. Gas, compressed air and steam connections are also provided throughout the building for experimental purposes.

Engineering services and plant were designed in the chief engineer's division of the Ministry of Works : engineer-in-charge, Mr. A. E. Hasler, A.M.I.E.E., A.M.I.H.V.E.

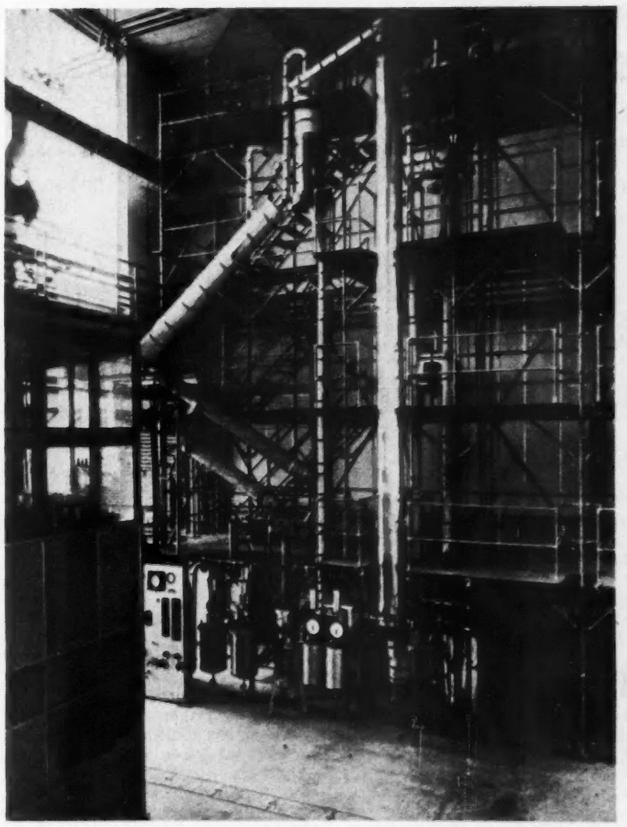


Fig. 3—Pilot-scale Fischer-Tropsch plant for experimental synthesis of oils and chemicals from carbon monoxide and hydrogen

Research Programmes

Two programmes formerly undertaken at Greenwich have been transferred to the Warren Spring Laboratory. One of these is the study of atmospheric pollution, which is now being tackled in the light of the requirements of the Clean Air Act. This applies in particular to the long-standing scheme for co-operative observations by local authorities, which is now being revised. Micro-surveys of the dispersion of chimney gas are being made in order to provide information which would assist in the design of chimneys and the siting of works. Previous successful measures for reducing smoke from hand-fired boilers on land are being applied to marine requirements, and a modified furnace front for a marine boiler has been designed which would admit sufficient secondary air to prevent the emission of dark smoke for more than about seven minutes every hour. Other studies include the scrubbing of flue gas with ammonia solution and recovering the sulphur as ammonium sulphate.

Studies of the synthesis of oils and chemicals from carbon monoxide and hydrogen, formerly undertaken at Greenwich, are being continued at Warren Spring Laboratory, the work being concerned with the catalytic conversion of the gas mixture into the desired end products. A plant for the slurry process is being developed (Fig. 3), this being the most promising version of the Fischer-Tropsch process for use in British conditions. The catalyst powder (iron oxide) is suspended in molten wax at a temperature of 265 deg. to 285 deg. Cent., and pressures between 8 and 30 atmospheres, and the gas is passed upwards through the fluid. The condensate products, consisting of petrol, diesel oil and heavy oil are separated by distillation. In this plant the height of the medium in the column can be checked by means of a caesium cell looking diametrically through the column at a geiger counter. These instruments can be hoisted or lowered by a motor drive and the rate of count shows the density of the medium at any point. This information may be read directly or recorded on a chart.

Mineral processing work is covering a number of subjects decided on in consultation with the Institution of Mining and Metallurgy, technicians from industry and the universities. Some projects in this field are being taken over from Harwell. The laboratories are equipped to handle most laboratory-scale, mineral-dressing operations, such as flotation, jigging, tabling, heavy media separation, wet and dry magnetic separation, and high-voltage separation. A pilot crushing plant of up to 2½ tons per hour capacity

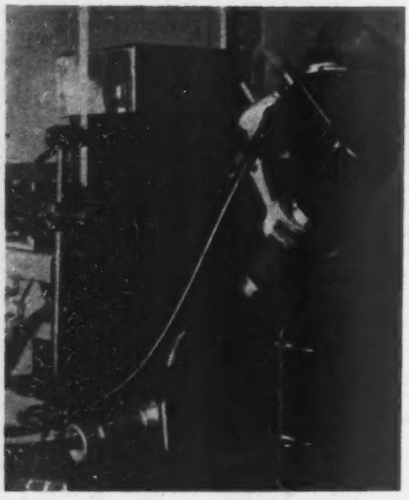


Fig. 4—Apparatus for investigating gas-liquid interfocal area on distillation plates by a photocell method

is installed, and flotation plant is available for treating up to 1000 lb per hour. Full-scale tests may be carried out with radioactive tracers. Water used in such tests is monitored before return to the town sewers, and if found to be above a certain level of radioactivity is removed by tanker to Harwell for disposal. Experiments in hydrometallurgy include methods of solvent extraction for use with lower grade ores for which grinding would not be satisfactory. In the Physical Chemistry Laboratory investigations are being undertaken to determine a quick test method for deciding on the best reagent for a metal.

Among the subjects of research in the Chemical Engineering Laboratory is a method of measuring the area of contact between a gas and a liquid by the refractive property of the foam (Fig. 4), which is shown as an electrical quantity. For observing the residence time of a liquid on a distillation plate, a radioactive tracer is injected and the plate is scanned by photocells, the output waveform being displayed on an oscilloscope.

MAIN CONTRACTORS

The contractors responsible for the main constructional work and principal items of equipment at the laboratory were as follows :—Main building contractor, The Turriff Construction Corporation, Ltd.; boiler-house installation, John Thompson (Wolverhampton), Ltd.; electrical installations (including external cables and kitchen equipment), London Electricity Board ; lifts, Evans Lifts, Ltd.; conversion of air compressors and equipment, cranes and weighbridges, Maintenance Contracts, Ltd.; 500-gallon petrol tank and dispense pump, Beck and Co., Ltd.; water storage tank, Braithwaite and Co. (Structural), Ltd.

Tensile Testing Machine for Radioactive Specimens

BY OUR AMERICAN EDITOR

THE Instron Engineering Corporation, of Canton, Massachusetts, has developed a testing machine with remote pulling unit to be employed in the tension testing of radioactive specimens in hot cells (Fig. 1). The major advantages of this machine are as follows :—(1) the pulling unit is readily available as a separate entity of small size and weight that can be manhandled ; (2) all connection between the pulling unit and the controls require only electrical connections so that the pulling unit may be easily connected upon being placed in the cell ; (3) the crosshead motion is directly controllable with great accuracy so that it is almost a second " hand " to supplement the single manipulator used. The crosshead of the machine is driven by a d.c. motor that is excited by the output of an amplidyne generator. The amplidyne output depends upon the error signal from a selsyn generator geared to the crosshead and a synchronously driven reference selsyn. The reference selsyn may be manually rotated so that the operator may, in effect, manually load or unload the specimen, or move the crosshead at any rate he desires, by rotating a single control. By oscillating the control the crosshead may be " jiggled " up and down at a fast rate to aid in fitting equipment to the crosshead or grips. The manual control permits the crosshead positions to be adjusted to any desired position, with an accuracy of 0·001in.

Fig. 1—Remote indicating and recording unit of " Instron " machine for tensile testing of radioactive specimens

A number of crosshead speeds between 0·002in and 2in per minute are available ; the machine, as normally supplied, operates over a speed range ten times greater. The load capacity of the machine is only 10,000 lb ; this is adequate to stress 0·25in diameter specimens to about 200,000 lb per square inch. Since there is little size effect in tension specimens, little is gained by using larger specimens, and irradiation is faciliated by using small specimens.

The grip used consists of a massive body with a tapered recess in which two wedge-shaped jaws may slide. The jaws have serrated V-shaped slots for gripping round or square specimens, and flat, serrated jaws are used for flat specimens. Normally, a manually operated lever is used to move the jaws, but the grip has been modified so that a double-acting air cylinder moves the jaws. With independent air pressure-regulating valves on each air line to each cylinder the jaws may be positioned at will. A universal joint is in series with both the lower and upper grips. To prevent the lower grip from toppling over, three air cylinders spaced equally about the axis of the lower grip act upward upon being energised to maintain the grip in a vertical position, except during actual pulling of the specimen.

The remotely operated extensometer is mounted on the lower grip of the tension testing machine, as shown in Fig. 2. Rotation about the vertical axis permits the application and removal of the extensometer. The lever arms transmit the relative motion of the knife edges due to specimen extension to the transducer, which is a " microformer." The extensometer produces no mechanical magnification. All magnification is produced electronically and, therefore, may be readily adjusted or changed at the control position. Magnifications as great as 6000 and as low as 10 have been used. Means are also provided for an electrical and mechanical calibration and suppression of the recorder zero. The extensometer is adaptable to a variety of specimen sizes and shapes and is quite flexible in operation as regards magnification and range changes either before or during testing. The ruggedness of the instrument has been repeatedly demonstrated ; it has continued to work, although the arms have been crushed between the grips and a large number of specimens supporting loads of 5000 lb or more have been broken with the extensometer in place.

Punching gauge marks on " hot " specimens is accomplished by holding the specimen in the longitudinal hole of a block. A set of holes perpendicular to the longitudinal axis of the block are drilled and reamed to accommodate a punch. In use the specimen is clamped in the block with the set screw and the punch inserted, and tapped with a light hammer in each hole until the required number of marks is made. Most subsize specimens that have been used have a reduced section six to eight times the diameter. Since the usual standard in this country is to use a gauge length four times the specimen diameter, gauge marks are made over the entire reduced section of the specimen so that fracture will always occur within a set of gauge length markers. Measurement of specimen elongation is not in itself difficult in the cell, but putting the broken ends back together is a difficult task if specimens are small, have a large reduction in area, or exhibit a fracture departing from the ideal cup and cone. Good results have been obtained with a device mounted on the lower crosshead on the tensile machine which consists of two chucks equipped with set screws ; the upper chuck slides in

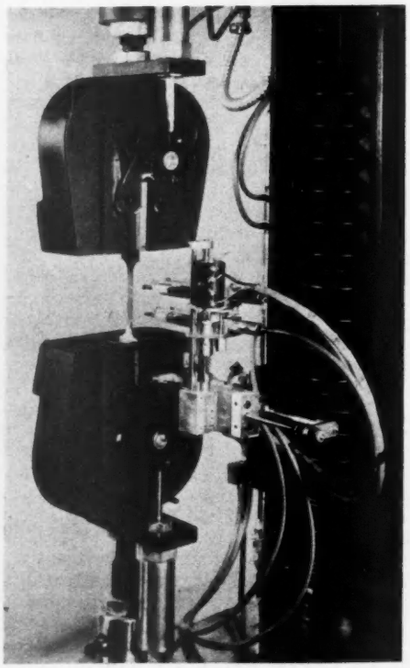


Fig. 2—Remote pulling unit with specimens gripheads and remotely operated extensometer

bushing. Half the specimen is placed in the lower chuck and the set screw tightened. To raise the upper chuck out of the way and insert the specimen one needs two hands ; the manipulator inserting the specimen is one, and a string leading out through the top of the hot cell is attached to an extension of the upper chuck for the second "hand." While watching the specimen through a 20-power telescope, the manipulator is used to rotate the upper chuck so that the specimen halves fit together. Elongation is measured by timing the passage of the gauge marks past the reticule in the viewing telescope as the crosshead is traversed at a known speed. Data are recorded by registering a pip on the "Instron" strip chart recorder, driven at a speed simply related to the crosshead speed as each gauge mark passes the reticule.

Diesel Electric Locomotive Progress in South Africa

BY OUR SOUTH AFRICAN CORRESPONDENT

The major consideration influencing the Union Department of Transport in its decision to introduce diesel locomotives into service was the fact that in certain areas satisfactory water supplies are becoming increasingly scarce.

In the northern parts of South-West Africa, where diesel locomotives will be used extensively, there is the further fact that as compared with the transport of coal over very long distances from the coalfields, fuel oil can be more conveniently and less expensively imported through Walvis Bay.

Fig. 1 shows the first diesel-electric locomotive for the South African Railways, while Fig. 2 shows a train hauled by two of the new locomotives recently placed in service. The main particulars of these locomotives are :

Performance :	
Gross horsepower	1320
Continuous horsepower to generator for traction	1200
Tractive effort at 30 per cent adhesion	46,350 lb
Continuous tractive effort	34,000 lb
Locomotive speed at maximum motor r.p.m.	60 m.p.h.
Weight :	
Basic locomotive (fully loaded)	154,500 lb
Per driving axle (fully loaded)	38,625 lb
Wheel arrangement	B-B

The first diesel-electric locomotive running shed, complete with machinery, cranes, tools and other equipment, is being built and equipped near Germiston, towards he northern end of that great railway centre. Before work on this shed, shown in Fig. 3, could be started, a new permanent way yard had to be provided at Elandsfontein, on the main line between Johannesburg and Pretoria. The next step was to clear the old yard of all material, and ballast trains ran for four months to move about 700 truck loads of railway material from the old to the new yard.

The foundations of the workshop and ancillary buildings were started during November, 1957. The steelwork and corrugated iron roofing of the running shed were erected by contract, while the Department undertook the brickwork, side-sheeting and internal layout, including pits and elevated platforms to facilitate servicing and repair work. The sheds are of modern design with adequate roof lighting, and have a floor area of 42,500 square feet.

The lubricating oil will be stored in three 5000-gallon capacity tanks inside the sheds and pumped to the various remote-controlled dispensing points. The water to be used for the diesel locomotives will be specially treated, for which purpose a water treatment plant has been installed. Laboratory assistants will be in charge of the treated water and the testing of oils. Two 100,000-gallon capacity tanks have been erected near the sheds for diesel fuel oil. The fuelling, sanding and lubrication oil installations are being built under contract and are now nearing completion. Nearly 3 miles of track to serve the diesel sheds have been laid to give access to the running sheds and concrete hard-standing, or daily inspection area, from both ends.

Acknowledgment is made to the South African Railways for the photographs here reproduced and for the information relating to diesel locomotive progress in service.

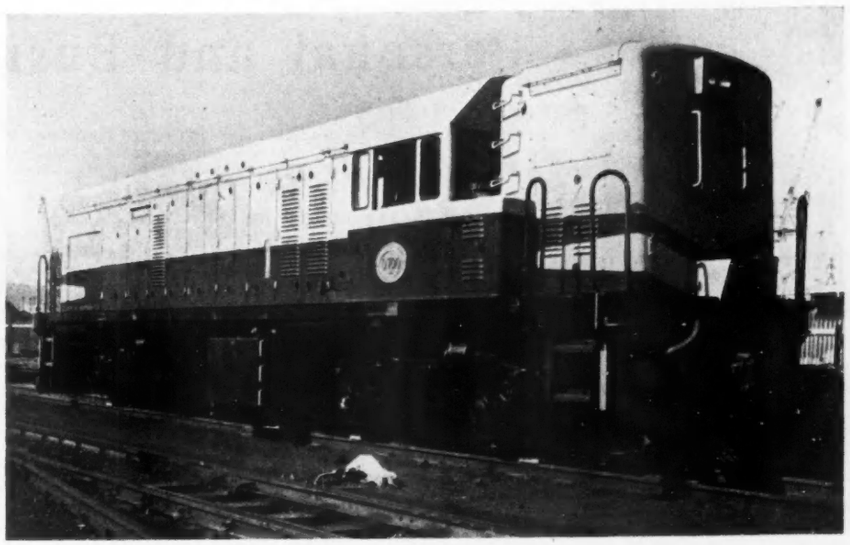


Fig. 1—First diesel-electric locomotive for the South African Railways

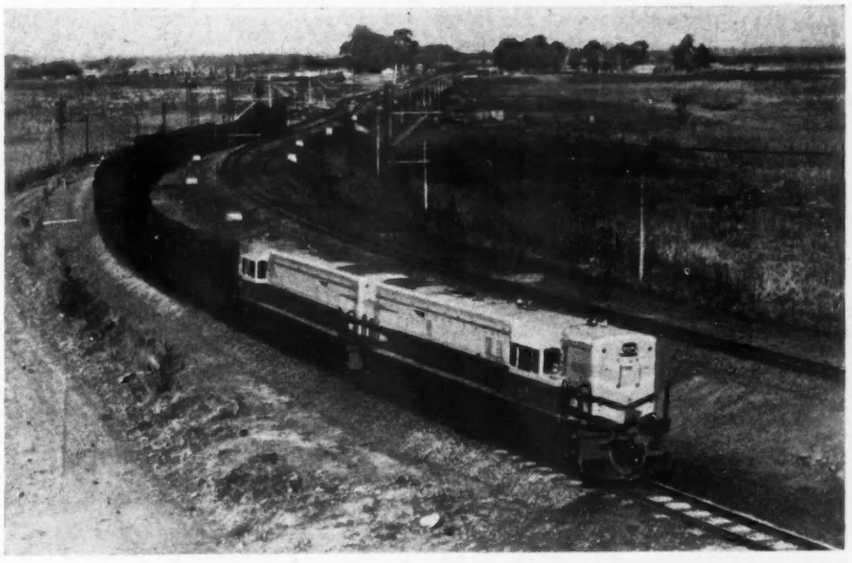


Fig. 2—A train hauled by two of the new diesel-electric locomotives recently placed in service

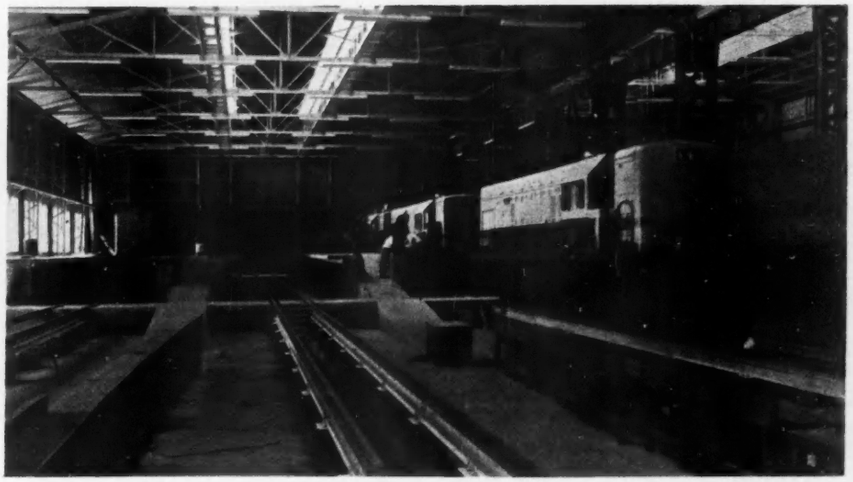


Fig. 3—Interior view of part of the diesel-electric running shed where maintenance work will be carried out on the locomotives. The elevated platforms in the background are 5ft above rail level and the repair pits are 4ft deep, below rail level

Personal and Business

Appointments

MR. C. R. WHEELER has been elected a director of Associated Electrical Industries Ltd.

MR. PETER ALLAN has been appointed a director and general manager of F. Perkins (Canada) Ltd.

MR. E. SEYMOUR-SEMPER, M.I.Mech.E., has been elected president of the Institute of Welding for 1959/60.

HEAT AND AIR SYSTEMS LTD., has announced that Mr. E. A. Barker, manager of the Stockport branch, has been appointed a director.

MR. J. E. CHADWICK has been appointed to head a new department of Koehring Company, to integrate sales to national and fleet buyers.

MR. J. T. B. OXFORD, A.M.I.Mech.E., has been elected to the Associated Electrical Industries Fellowship in Engineering at Cambridge.

MR. A. W. MARTIN has been elected chairman of the board of directors of Charles Winn and Co., Ltd., following the retirement of Mr. N. K. Mousley.

MR. S. F. C. WHITMORE, A.M.I.E.E., has been appointed deputy chairman of the South Western Electricity Board in succession to Mr. E. C. Willis, Comp.I.E.E., who has retired.

Mr. R. H. BURDETT, A.M.I.Mech.E., A.M.I.E.E., of the research and development department of the Central Electricity Generating Board has been appointed deputy director (mechanical) in the applications branch, research and development department.

METROPOLITAN-CAMMELL CARRIAGE AND WAGON CO., LTD., announces that Mr. H. N. Edwards, whilst continuing to hold the office of managing director has, in addition, been appointed to succeed the late Sir Archibald J. Boyd as chairman of the company.

THE MINISTRY OF SUPPLY announces that Dr. D. Cameron has been appointed chief superintendent of the Aeroplane and Armament Experimental Establishment at Boscombe Down in succession to Mr. D. E. Morris who has been appointed chief superintendent and head of aerodynamics divisions at the Royal Aircraft Establishment, Bedford. These appointments will take effect in September.

JOHN THOMPSON LTD., announces that Mr. L. Edgar has relinquished his appointment as group publicity manager of the John Thompson Group of Companies, but will continue to serve in an advisory capacity on publicity and press matters. Mr. D. H. Edson, hitherto assistant publicity manager, has been appointed group publicity manager, and Mr. G. O. Ham, has been appointed assistant group publicity manager.

MR. D. C. M. SALT has been promoted director of sales and Mr. J. M. Kershaw director of development and market research of Monsanto Chemicals Ltd. The company has at the same time discontinued its divisional organisation and its two divisional development departments have been unified under Dr. J. A. Gardner as controller of development. Mr. O. W. Murray has been appointed chief engineer in place of Mr. Kershaw.

Business Announcements

MR. R. J. LEWIS, a director of Kerry's (Great Britain) Ltd., has retired.

SUTCLIFFE HYDRAULICS LTD., has moved from North Featherstone, Yorkshire, to Speedwell Works, Castleford, Yorkshire.

HILGER AND WATTS LTD., has appointed Mr. D. G. Heywood as representative for the areas Yorkshire, Lancashire, Cheshire and North Lincolnshire.

EVERSHED AND VIGNOLES LTD., has announced the removal of its Scottish area office to 30, Rutland Square, Edinburgh 1 (telephone Fountainbridge 3056).

STREAM-LINE FILTERS LTD., are moving from Ingate place, S.W.8. to Henley Park, Normandy, nr. Guildford, Surrey, (telephone Normandy 3311-3). The move will be completed by August 10.

BRITISH INDICATORS (SALES) LTD., Sutton Road, St. Albans, Herts., has been appointed sole concessionaire for the United Kingdom for the sale of Burton hardness testers manufactured by J. O. Deakin and Co., Ltd.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., and ENGLISH ELECTRIC VALVE CO., LTD., announce the appointment of the Ampex Corporation, Redwood City, California, as authorised distributor in the United States, of their sound and vision broadcasting equipment and television camera tubes.

THORN ELECTRICAL INDUSTRIES LTD., announces that as a result of an agreement between its subsidiary Atlas Lighting Ltd., and Luminator Incorporated of America, it has acquired a licence for the manufacture and distribution of Luminator bus, ship, aircraft and train lighting fittings in this country.

THE CONSOLIDATED PNEUMATIC TOOL CO., LTD., 232, Dawes Road, London, S.W.6, announces that its parent company, the Chicago Pneumatic Tool Company, New York, has acquired the Reich Bros. Manufacturing Company Inc., of Terre Haute, Ind., U.S.A. The acquisition also includes the Reichdrill Manufacturing Co., Ltd., of Glasgow, and that company will, henceforth, operate as the Reichdrill Division of Consolidated Pneumatic.

Contracts

WOODALL-DUCKHAM CONSTRUCTION COMPANY, Ltd., has received a contract from Colvilles, Ltd., to build a complete coke oven and by-product plant costing about £2,250,000. This is in connection with the next stage of the developments at the Ravenscraig works.

WOODALL-DUCKHAM (AUSTRALASIA) PTY. Ltd., a member of the Woodall-Duckham Group of Companies, has received an order valued at over £A400,000 for a new continuous vertical retort installation to be built at Dunedin, New Zealand for the Dunedin Gas Department.

JOHN HOWARD AND CO., Ltd., has been awarded a contract for the construction of Rosneath jetty by the Admiralty on behalf of the North Atlantic Treaty Organisation. The work consists of an approach jetty 550ft long by 20ft wide, with a jetty head 40ft wide and 300ft long, and its value approaches £100,000. The contract time is thirty-two weeks.

TAYLOR WOODROW CONSTRUCTION, Ltd., has been awarded a contract valued at over £1,000,000 by the Central Electricity Generating Board for a hydro-electric project at Cwm Rheidol, near Aberystwyth, Cardiganshire. The consulting engineers are Messrs. Freeman, Fox and Partners in association with Messrs. James Williamson and Partners. The work will take two years to complete. It involves the construction of a 700ft long concrete gravity dam 40ft high ; a tunnel, 2200ft long, with a finished diameter of 9ft 6in ; a 25ft diameter surge shaft to a depth of 150ft, and a 10ft diameter pressure shaft to a depth of a further 510ft ; a power station in which two 18MW turbo-alternators will be installed ; ancillary works including a fish ladder. This contract is the fourth and last of the major civil engineering contracts of the Rheidol hydro-electric project, the construction of which has been in progress for two years.

TARMAC CIVIL ENGINEERING, Ltd., has been awarded a contract by the Ministry of Transport and Civil Aviation for the modernisation of two lengths of road between London and the London-Birmingham Motorway, at a cost of £480,000. One length links the recently completed London Colney by-pass to the Park Street terminal of the St. Albans by-pass on A.405, and the other starts at the south-eastern end of the London Colney by-pass and will lead to the projected South Mimms by-pass on A.6. The total length of road to be improved will be nearly 3 miles. Two 24ft wide carriageways will replace the existing 30ft wide carriageway. They will be surfaced with asphalt laid on lean concrete. A flyover bridge will be provided to deal with traffic crossing the improved length of A.405 between Napsbury Lane and Shenley Lane. The work is expected to take thirteen months to complete, the road being kept open to traffic. The improvement has been designed for the Ministry of Transport and Civil Aviation by Hertfordshire County Council (county surveyor, Lieut.-Col. C. H. ffolliott, B.A., M.I.C.E.).

STANDARD TELEPHONES AND CABLES, Ltd., has received an order from the British Transport Commission for voice-frequency supervisory control equipment to be installed at Romford and Pitsea, Eastern Region, British Railways and at 46 outstations, in connection with high-voltage a.c. 50c/s electrification from Liverpool Street and Fenchurch Street stations respectively. Romford will control traction supplies on the routes to Enfield, Hertford East, Bishops Stortford and Chingford, with provision for ultimate control of the Stratford-Tottenham-Cheshunt lines; also the sections beyond Chelmsford to Ipswich and Harwich, and the existing Colchester-Clacton-Walton trial section (see our May 8, 1959, issue, page 738). Pitsea will control supplies on the lines to Tilbury and Southend. Initially 32 outstations will be controlled from Romford and 14 from Pitsea. They will be grouped as parties on a four-wire telegraph system, each with a separate tone. Additional tones will be used where necessary to return metering information to the control stations. The order also includes replacement of the existing S.T.C. supervisory system on the Chelmsford and Southend routes from Liverpool Street when these are converted to a.c.

Miscellanea

"SWISS ACHIEVEMENT."—In our supplement published on June 19, we referred on page 26 to locomotive transmission gears in course of construction at the Swiss Locomotive and Machine Works, Winterthur. These gears which are being made for British Railways, we erroneously described as being oil-operated. They are in fact mechanical drives, mainly comprising a pinion meshing with a resilient toothed wheel.

BUILDING PLANT EXHIBITION.—In reply to a recent question in Parliament, the Minister of Works expressed the opinion that the building plant exhibitions organised by his department had achieved their object of stimulating the use of mechanical plant. He believed that industry itself should now be responsible for any further development of the idea. With that in mind, the Minister said, his department did not contemplate organising any more of these exhibitions.

PLANNED MAINTENANCE.—The Harrow and Wembley Productivity Association, in conjunction with the British Productivity Council, will hold a one-day conference on planned maintenance at the Livingstone Hall, Broadway, London, S.W.1, on Tuesday, October 6. Mr. J. B. Kitchin, of I.C.I., Ltd., will take the chair and the principal speaker will be Mr. R. B. Wilson, of the European Productivity Association, who will speak on "Maintenance as a General Management Problem" and "How Much Should you Spend to Prevent Breakdowns ?" Mr. G. G. Corder, of Kodak, Ltd., will give a talk on "Maintenance Efficiency Measurement," and Mr. H. H. Gomme, of Personnel Administration, Ltd., will speak on "The Best Use of Maintenance Manpower." Applications for tickets, price 1 guinea, and requests for further details should be sent to the Secretary, Harrow and Wembley Productivity Association, Kodak, Ltd., Harrow, Middlesex.

VIADUCTS FOR MIDLANDS AND NORTH-WEST MOTORWAY.—Contracts have been let for three major viaducts on the first section of the Birmingham-Preston-Penrith motorway. They are at Creswell in Staffordshire, at Thelwall on the Lancashire and Cheshire border, and at Gathurst in Lancashire. Together, they will cost nearly £7,500,000; they are being started before the roadworks so that both can be completed at about the same time.

The Creswell Viaduct will be nearly two-thirds of a mile long and will carry the motorway over the River Sow, a main railway line and deep pockets of peat bog near Stafford. It will consist of a series of bridges joined by embankments, the bridges having five, four and three 70ft spans respectively. The total cost of the viaduct will be about £1,200,000 and the contract has been let to J. L. Keir and Co., Ltd.

The Thelwall Viaduct will carry the motorway over the River Mersey and the Manchester Ship Canal east of Warrington; it will be a mile and a quarter long with 36 spans. A span of 336ft will give 75ft headroom over the waterway and will be of riveted steel construction. It will consist of cantilevers and a suspended section, with balancing cantilevers forming the span on each side. The approach spans will be of welded steel and the deck throughout will be of reinforced concrete. The contract for the viaduct and its approaches (total cost about £5,250,000) has been let to Leonard Fairclough Ltd.

The Gathurst Viaduct, north-west of Wigan, will be just under a quarter of a mile long and will be a six-span structure, taking the road over the River Douglas, the Leeds–Liverpool Canal and the Wigan–Southport line of British Railways. The bridge will be of welded steel girder construction with a reinforced concrete deck. It will cost about £870,000 and the contractor is A. Monk and Co., Ltd.

The Thelwall and Gathurst Viaducts have been designed by the Lancashire County Surveyor and Bridge Master Mr. James Drake, M.I.C.E., and the Creswell Viaduct by Mr. F. Jepson, M.I.C.E. the Staffordshire County Surveyor.

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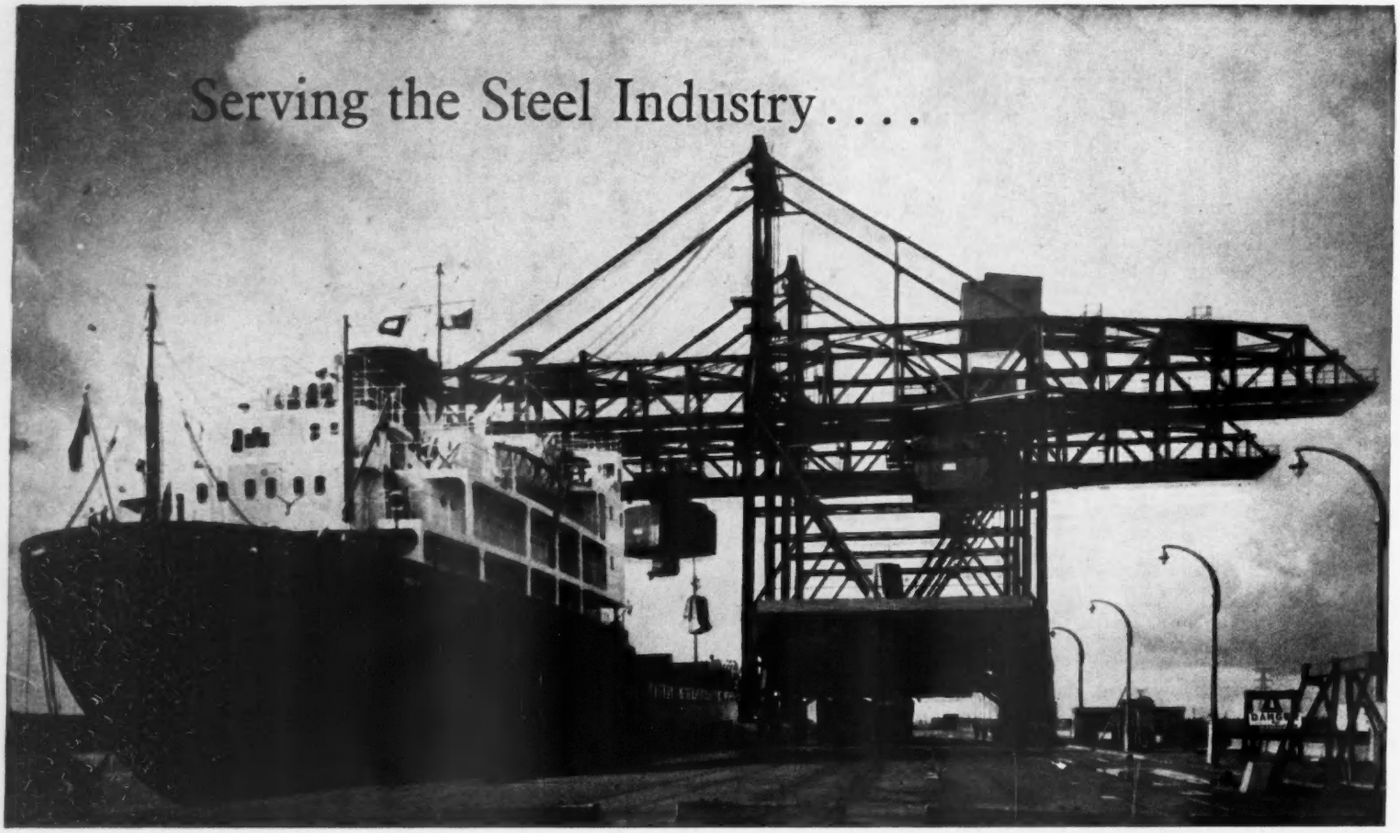

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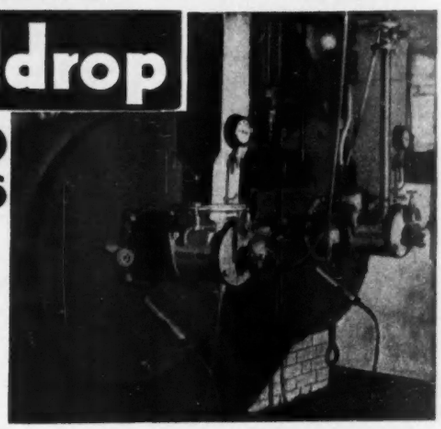

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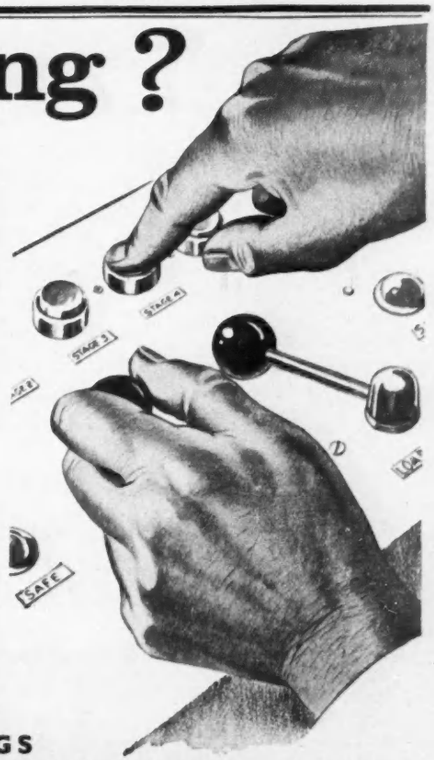

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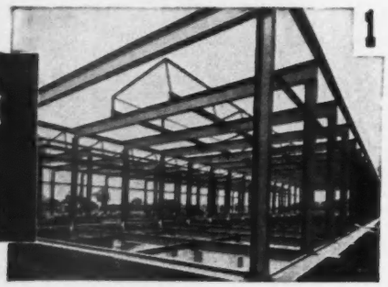
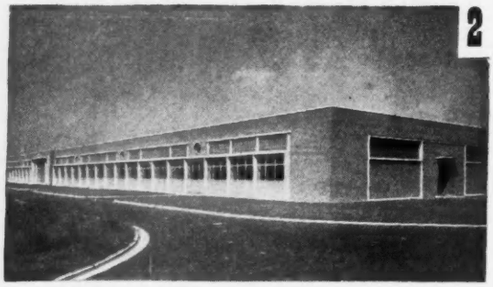


1 College of Further Education, Grimsby, in course of erection. Stage I.

2 The Completed College. Stage I.

3 The County Primary School, Crosland Moor, Huddersfield.



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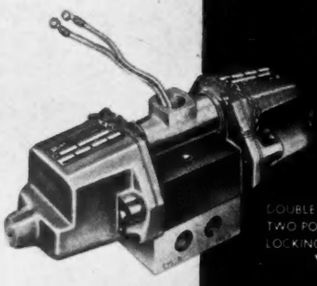

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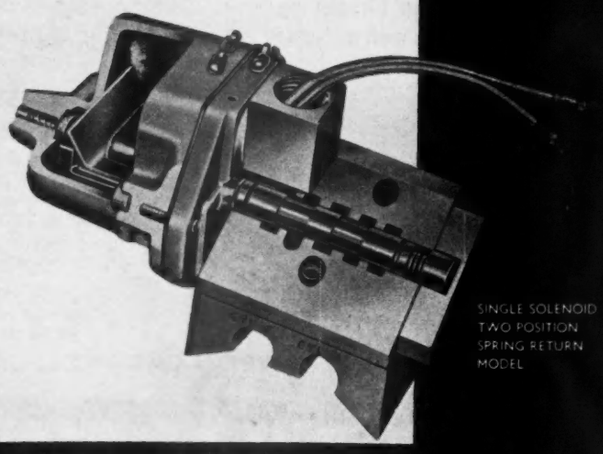

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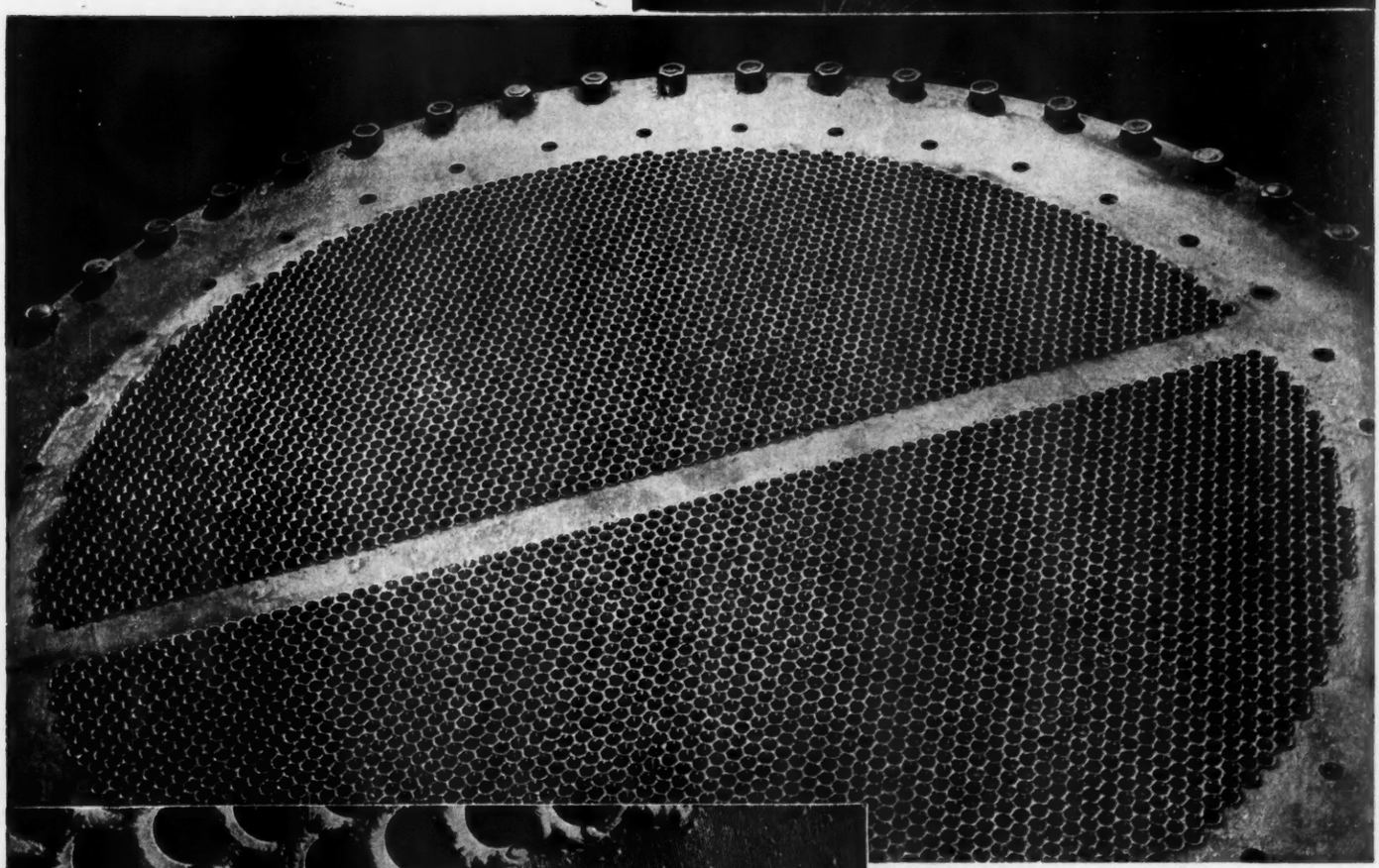

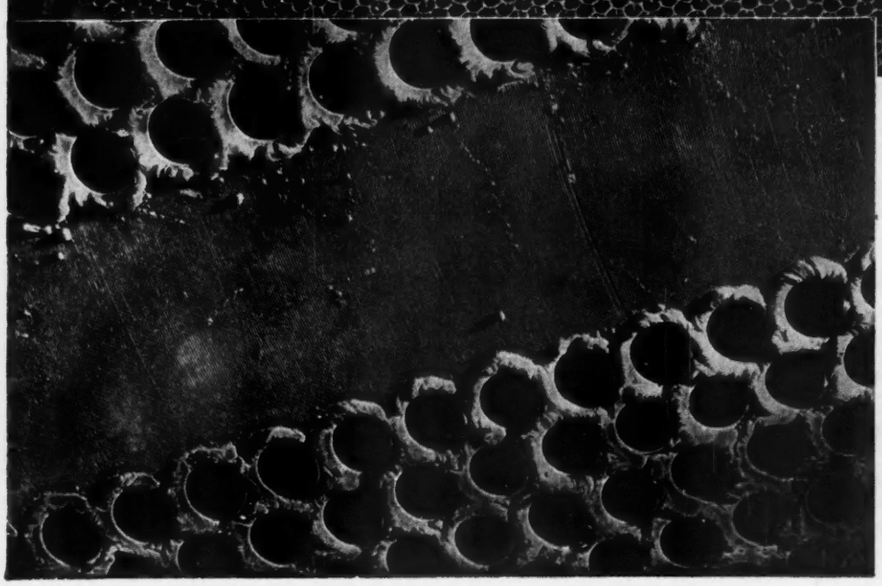

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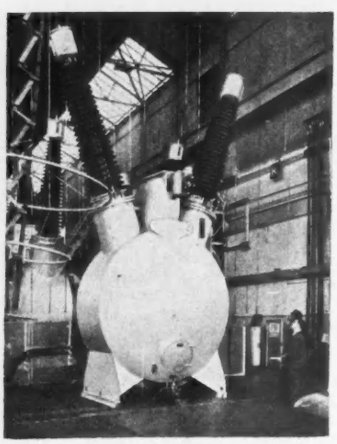

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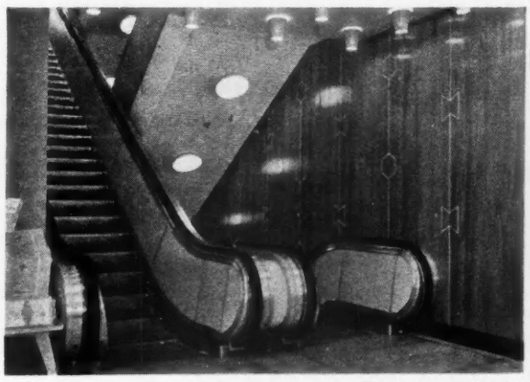

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INDEX TO ADVERTISERS

	PAGE
Abbott & Co. (Newark), Ltd.	6
Austin, J., & Sons (Dewsbury), Ltd.	14
Avery, W. & T., Ltd.	2
Birkett, T. M., Billington & Newton, Ltd.	13
Booth, J., & Bros.	12
Brownlie & Murray, Ltd.	16
Bullers, Ltd.	16
Bullows, A., & Sons, Ltd.	18
Butcher, H., & Co.	20
Carr, C., Ltd.	9
Clyde Crane & Booth, Ltd.	12
Clyde Crane & Engineering Co.	12
Cross Manufacturing Co. (1938), Ltd.	4
Farmer, L., & Sons	20
Foord, J., & Co.	20
Ford Motor Co., Ltd.	9
Fuller, Horsey Sons & Cassell	20
General Electric Co., Ltd.	5
Goodwin, R., & Sons (Engineers), Ltd.	16
Grafton Cranes, Ltd.	9
Hall, J. & E., Ltd.	17
Harper, J.	18
Harvey, G. A., & Co. (London), Ltd.	15
Ince Forge Co., Ltd.	13
Knight, Frank & Rutley	20
Lafarge Aluminous Cement Co., Ltd.	11
Metropolitan-Vickers Electrical Co., Ltd.	8
Norris Bros., Ltd.	13
Paterson Engineering Co., Ltd.	10
Phillips, J. W., & C. T., Ltd.	6
Pinchin, Johnson & Co.	4
Research Engineers, Ltd.	18
Richards & Partners	20
Robertson & Ferguson, Ltd.	5
SM Precision Spinning Co., Ltd.	13
Schieldrop & Co., Ltd.	13
Spencer - Bonecourt - Clarkson, Ltd.	6
St. Georges (Engineers), Ltd.	4
Tangyes, Ltd.	10
Taylor & Hubbard, Ltd.	16
Tilghmans, Ltd.	7
Tonks, J., & Co., Ltd.	16
Turner Bros. Asbestos Co., Ltd.	6
Visco Engineering Co., Ltd.	3
Ward, T. W., Ltd.	18
Wellman Bibby Co., Ltd.	4
Wellman Smith Owen Engineering Corporation, Ltd.	14
Wheatley Kirk Price & Co.	20

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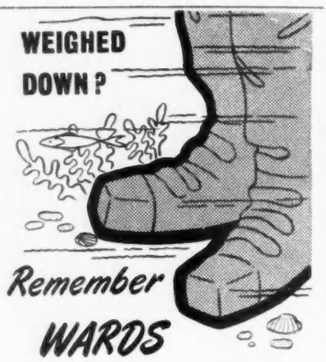

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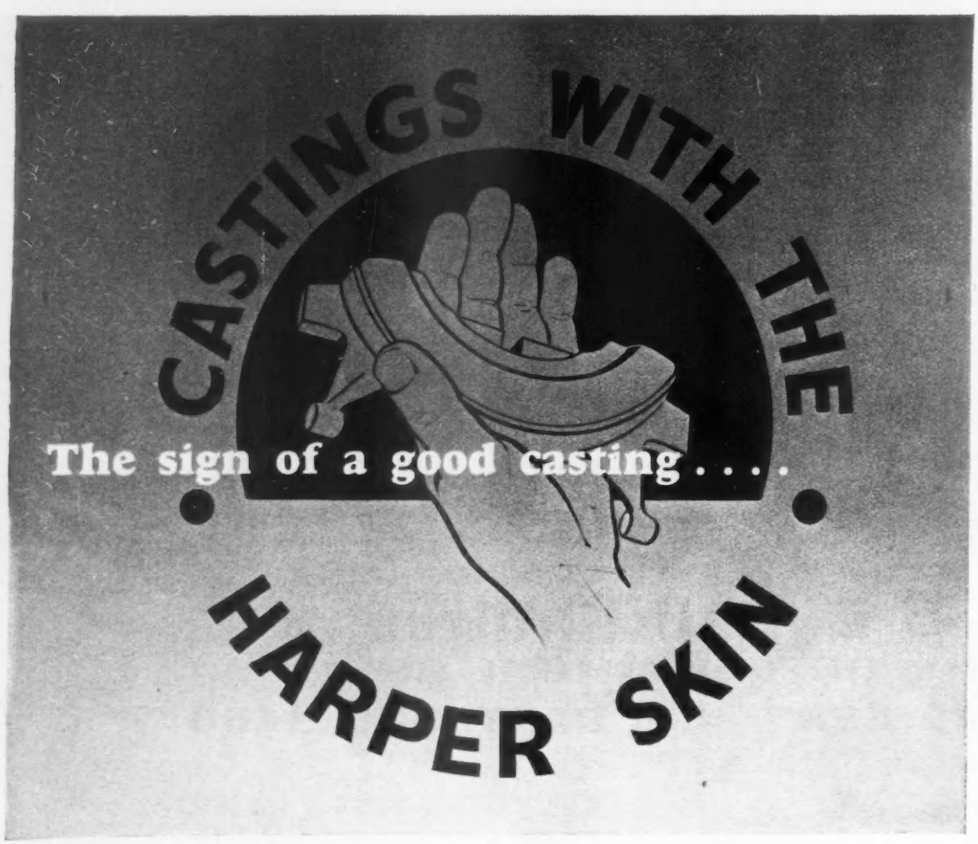

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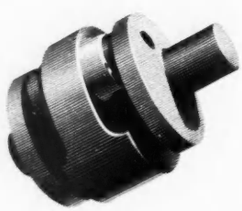

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Weston Model 400/100. Double-Sided Friction Screw Press, of welded steel plate construction, arranged motor drive for 400/3/50, pressure exerted approximately 120 tons, maximum stroke 11in., diameter of screw with four starts 6¾in., size of bed 21¼in. by 18in. Weight approximately 5 tons 8 cwt.

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